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by James A. Cochrane and Robert M. Henry

Langley Research Center
Langley Station, Hampton, Va.

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SUMMARY

A nearly continuous $3\frac{1}{2}$-year sample of low-level wind data has been collected from anemometers mounted at five levels on the 250-foot (76.2-meter) meteorological tower at Wallops Island, Virginia. Fifteen-minute averages of speed and direction were read out at hourly intervals. The statistical treatment and the homogeneity of the sample are discussed. Two types of statistical information – frequency-distribution data and statistical parameters – were computed from the sample.

The frequency-distribution information is of three types: (1) percentage probabilities of being less than or equal to a given value of wind speed; (2) wind-speed limits for selected percentiles; and (3) frequency of speed-direction groups. The use of each type of frequency information is briefly discussed. Because some design applications must consider the gust component of surface winds, a method of obtaining peak winds from the percentile values (that is, from 15-minute averages) is summarized.

The tabulation of fundamental statistical parameters (for example, means, standard deviations, and interlevel and intralevel correlation coefficients) provides further information on specific properties of the wind distribution. The parameters are presented for various combinations of hourly, monthly, and annual periods. A few conclusions are drawn about the diurnal and seasonal variations in the statistical parameters.

The statistical data included in this report provide the best available information on the low-level wind environment at Wallops Island and should be useful for establishing design criteria and supporting launch operations at NASA Wallops Station.

INTRODUCTION

The winds at levels below 150 meters (492 feet) are often called "ground" or "surface" winds and are of considerable importance in the design of large structures and in the operation of aircraft during take-off and the approach and landing condition. Increased importance is placed on the knowledge of these winds for the launch operations of sounding rockets and launch vehicles. These operations, because of their very nature,

are conducted in isolated areas where wind data are not generally available. The wind data from such isolated areas must be collected, therefore, for use in the design and operation of launch vehicles, design of ground structures, and planning of experiments. The usual procedure for collecting surface wind data is by mounting anemometers on a pole or tower.

Although meteorological towers are now operating at several locations within the United States (for example, Cape Kennedy, Florida; Brookhaven National Laboratory near Upton, New York; White Sands Missile Range, New Mexico; and Wallops Island, Virginia), only a limited number of statistical studies of the surface wind data have been published. A complete bibliography of research concerning surface winds and tower data is presented in reference 1. The data for Brookhaven (ref. 2) and for White Sands (ref. 3) are of especial interest because data were simultaneously recorded at several altitude levels.

Previous treatments of Wallops Island winds have been limited to altitude levels above 150 meters (ref. 4) or have been crude approximations based on low-level wind data collected at weather stations in the vicinity of Wallops Island (refs. 5 and 6). Consequently, no accurate statistical information on the surface wind environment at Wallops Island has been available. In order to provide the needed surface wind data for Wallops Island, anemometers were mounted at five levels on the 250-foot (76.2-meter) meteorological tower. A $3\frac{1}{2}$-year sample of data for each level of the tower has been analyzed and statistical summaries of these data are included in this report. This low-level wind summary has been prepared primarily for support of range operations, planning of experiments, and design of structures for use at the NASA Wallops Station launching areas on Wallops Island, Virginia. Because of the relative scarcity of data of the type presented, they are also expected to be of interest to meteorologists and climatologists.

DESCRIPTION OF DATA

Data Source

All observations used in this study were made from anemometers mounted on the 250-foot (76.2-meter) meteorological tower which is located on the southern part of Wallops Island, Virginia. Figure 1 shows the location of the 250-foot (76.2-meter) meteorological tower in relation to the other structures and terrain at Wallops Island. The island is approximately $2\frac{1}{2}$ kilometers $\left(1\frac{1}{2} \text{ miles}\right)$ wide and about 9 kilometers $\left(5\frac{3}{4} \text{ miles}\right)$ long and is located at 37° 50' north latitude, 75° 29' west longitude. The island extends northeast-southwest and forms the Atlantic coast in this area. The Atlantic Ocean is about 100 meters southeast of the tower. The island is separated from the Delmarva peninsula by extensive mud flats. The terrain of the island is very flat and sandy and has a sparse coverage of grass and low shrubs. The primary obstructions are the assembly

building located about 100 meters to the south of the tower, an enclosed launching tower about 200 meters south of the tower, the microwave relay tower to the west, and a water tower to the northeast of the meteorological tower. The effects of these obstructions are not expected to be significant for the type of data presented.

Details of the 250-foot (76.2-meter) meteorological tower are shown in figure 2. It is a rigidly braced, self-supporting (unguyed) structure. During the data collection period, aerovane anemometers were located at nominal tower levels of 50 feet, 100 feet, 150 feet, 200 feet, and 250 feet. However, because of the mounting arrangements, the actual heights of the anemometers from the base of the tower were 54.3 feet (16.5 meters), 104.3 feet (31.7 meters), 154.3 feet (46.9 meters), 204.3 feet (62.1 meters), and 254.3 feet (77.3 meters). (The base of the tower is 6 feet (1.8 meters) above mean sea level.) The anemometers are attached to 6-foot (1.8-meter) booms which extend horizontally from opposite corners of the tower. An automatic switching device was used to record data from the upwind side of the tower to minimize tower interference. Data from the active aerovanes were recorded in oscillograph form.

Scope of Data

The recording period of the data sample used in this statistical analysis was from October 17, 1961, to March 31, 1965. This period is the longest period of nearly continuous wind data available for Wallops Island. Data were not recorded from any tower level during a 51-hour period on March 7, 8, and 9 of 1962 because of a power failure at Wallops Island. The power failure was caused by flooding brought about by strong winds (the Ash Wednesday storm of 1962). Similar storm conditions had occurred only one other time during the last century. No attempt was made to fill in the missing data, and the period of missing data was excluded from the sample used for the statistical analysis.

Another factor which affected the number of discrete observations read from the $3\frac{1}{2}$ years of oscillograph records was that on several occasions one or more anemometers failed to operate while data from the remaining anemometers at other tower levels were continuously recorded. Consequently, the actual number of discrete observations for each tower level derived from the $3\frac{1}{2}$-year sample varied by as much as 10 percent.

TREATMENT OF DATA SAMPLE

Read-Out Procedure

Fifteen-minute averages of the traces of the oscillograph records were read graphically by the equal-area method from time t to $t + 15$ minutes for each hour (Eastern Standard Time) during the $3\frac{1}{2}$-year period. Because of the large averaging period, the gust characteristics of the surface wind were filtered out, and the response characteristics

of the aerovane did not significantly influence accuracy of the read-out data. Speeds were read to the nearest whole mile per hour. However, all speed values were converted to whole meters per second (a conversion factor of 0.447 being employed). Values of 1 mile per hour were converted to 1 meter per second, so only winds less than 0.5 mile per hour (0.2 meter per second) would appear in the tabulations as calm winds. Directions were read to the nearest 1^{o}, 5^{o}, or 10^{o} during various periods of time.

The oscillograph records were originally read out and tabulated by personnel at the Wallops Island Weather Bureau Support Facility. A statistical procedure developed by Dr. H. L. Crutcher of the National Weather Records Center (NWRC) was used to verify the accuracy of the read-out values for speed and direction. The $3\frac{1}{2}$-year sample was first divided into 42 calendar months. Because data were available for five altitude levels, the total sample consisted of 210 level-months. (A level-month is a sample for a calendar month period at a specific altitude level.) The next step of this procedure was to select a random sample (by using random number procedure) of 5 level-months from the total sample of 210 level-months. The original oscillograph records for the 5 level-months in the random sample were then reread (by using the original read-out procedure) by NWRC personnel. Thus, two independent sets of read-out data were obtained for each of the 5 level-months. The vector difference between the two independent sets of read-out data was computed. The bias or arithmetic mean difference in estimating the vector mean wind (as inferred from the sample of five comparisons) was found to be about 0.1 m/sec. The root-mean-square difference was about 0.8 m/sec. Accordingly, the differences between the two sets of read-out data were small enough to verify the accuracy of the original values for speed and direction read out by Wallops personnel.

Statistical Analysis

After the accuracy of the tabulated data had been verified, the tabulated data from the entire 210 level-months sample were converted into punch cards. Copies of the original punch cards (or magnetic tapes) can be obtained from the National Weather Records Center (NWRC). All the statistical tabulations were performed on computers at the NWRC under a Langley Research Center contract L-74397. Four volumes of detailed winds-aloft summaries and one volume of interlevel correlation coefficients resulted from the contract.[1] The five volumes included the following information:

[1]Copies of any of these five volumes can be obtained by writing to the Director, National Weather Records Center, Federal Building, Asheville, N.C. 28801. Reference should be made to NWRC Job No. 6774.

Volume 1 contains year-month-level summaries for 50- and 250-foot (15.24- and 76.20-meter) levels (all hours combined)

Volume 2 contains level-month summaries for 50- (15.24-), 100- (30.48-), 150- (45.72-), 200- (60.96-), and 250-foot (76.20-meter) levels (all years combined)

Volume 3 contains hour-month summaries for 50- and 250-foot (15.24- and 76.20-meter) levels (all years combined)

Volume 4 contains annual summaries (all years combined) for 50-, 100-, 150-, 200-, and 250-foot levels

Volume 5 contains interlevel correlation coefficients between velocity components at 50-, 100-, 150-, 200-, and 250-foot levels by month (all years combined).

Although the five volumes of statistical summaries supplied to Langley by NWRC provide a very detailed description of the surface wind environment at Wallops Island (which may be needed for special purposes), much of this statistical information is not essential to engineering applications. For this reason, two types of data – frequency-distribution data and fundamental statistical parameters – were extracted from the five volumes of winds-aloft summaries and are tabulated in this report.

Frequency-distribution information.- The three types of frequency-distribution information presented in this report are as follows: (1) percentage probabilities of not exceeding a given value of wind speed, (2) wind speeds for selected percentiles, and (3) frequency of speed-direction combinations. Although these three frequency tabulations are related, each tabulation has a different use. The percentage probability of not exceeding a given value will suffice for any application (for example, structural design) where the direction of the wind is not a factor. The wind speeds associated with certain percentiles (for example, 50.0, 95.0, 99.0, and 99.9 percentiles) are also used for design applications and can be modified to reflect the gustiness of the wind. On the other hand, the frequency of speed-direction combinations is used for applications (for example, vehicle launchings) where the combinations of direction and wind speeds are important.

Statistical parameters.- The statistical parameters tabulated in this report are defined as follows:

Magnitude of vector mean wind: The resultant mean vector of the individual wind vectors in a distribution consists of the direction θ from which the wind blows (measured clockwise from true north) and speed $\left|\overline{V}_r\right|$. The direction and speed are computed from the following relationships:

$$\theta = \arctan \frac{\Sigma X}{\Sigma Y} \tag{1}$$

$$\left|\overline{V}_r\right| = \sqrt{\frac{(\Sigma X)^2 + (\Sigma Y)^2}{N^2}} \tag{2}$$

where

X zonal (west-to-east) wind component

Y meridional (south-to-north) wind component

N number of observations used in computation

Mean of zonal components: The mean of the zonal components is given by $\Sigma X/N$. Zonal components from the west are positive.

Mean of meridional components: The mean of the meridional components is given by $\Sigma Y/N$. Meridional components from the south are positive.

Scalar mean wind: The scalar mean wind $\overline{V}$ is given by the following relationship:

$$\overline{V} = \frac{\Sigma|V_i|}{N}$$

where V_i is the observed wind speed.

Standard deviation of zonal component σ_X: The standard deviation of the distribution of individual zonal components of the observations is σ_X. Its value can be computed as follows:

$$\sigma_X = \sqrt{\frac{\Sigma X^2}{N - 1} - \frac{(\Sigma X)^2}{N(N - 1)}} \tag{3}$$

Standard deviation of the meridional component σ_Y: The standard deviation of the individual meridional components of the observations is σ_Y. Its value can be computed as follows:

$$\sigma_Y = \sqrt{\frac{\Sigma Y^2}{N - 1} - \frac{(\Sigma Y)^2}{N(N - 1)}} \tag{4}$$

Correlation coefficient of zonal and meridional components: Since the summaries of σ_X and σ_Y are based on $N - 1$ degrees of freedom (that is, are estimates of the standard deviation of the population), the formula used to calculate r_{XY} is as follows:

$$r_{XY} = \frac{N\Sigma XY - \Sigma X\Sigma Y}{N(N - 1)\sigma_X\sigma_Y} \tag{5}$$

This value is the correlation coefficient of the sample and tends to be higher than the correlation coefficient of the population (especially when the sample is small). If it is desired to convert r_{XY} to the best estimate of correlation in the population $\bar{r}_{XY}$, it may be done with the following formula:

$$\bar{r}_{XY} = \sqrt{\frac{(r_{XY})^2(N - 1) - 1}{(N - 2)}} \tag{6}$$

If the value of r_{XY} is very low, the quantity under the radical may be negative (and $\bar{r}_{XY}$ imaginary). In such a case the correlation of the population should be considered to be zero.

Interlevel correlation coefficients r_{ij}: The interlevel correlation coefficients r_{ij} give the correlations of the same components (zonal or meridional) at two different altitudes Z_i and Z_j. The value of r_{ij} for the zonal component can be computed as follows:

$$r_{ij} = \frac{N\Sigma X_i X_j - \Sigma X_i \Sigma X_j}{N(N - 1)(\sigma_X)_i(\sigma_X)_j} \tag{7}$$

and for the meridional component as follows:

$$r_{ij} = \frac{N\Sigma Y_i Y_j - \Sigma Y_i \Sigma Y_j}{N(N - 1)(\sigma_Y)_i(\sigma_Y)_j} \tag{8}$$

since $r_{ij} = r_{ji}$, only one-half of the symmetrical matrix of r_{ij} is computed.

APPLICABILITY OF RESULTS

For a relatively short record period such as is used here, the degree of homogeneity of the data is of especial interest. If the variation of the statistical parameters from year to year is great, values computed over only a few years may be poor estimates of the long-term value. On the other hand, if the year-to-year variation is small, averages over even a relatively short period may form very useful estimates. Values of several fundamental statistical parameters (as defined in section "Treatment of Data") were computed for single years, and their values for different years are shown in table I. Table I(a) presents values for the 50-foot (15.24-meter) tower level, and table I(b) presents values for the 250-foot (76.20-meter) tower level. Examination of the values in these tables indicates a reasonably good degree of homogeneity in the data, and it is concluded that the averages given in the report are indeed valid and useful estimates of the long-term values, although a longer record would, of course, be desirable.

PRESENTATION AND DISCUSSION OF STATISTICAL DATA

Frequency Distribution Data

Tables II contain the empirical cumulative percentage probability of wind speed (magnitude of the wind-velocity vector) being less than or equal to given speed values. This information will suffice for applications where wind direction is not a factor. Each table summarizes the probability information for a particular altitude level. The given speed values are listed as column headings. ("Calm" is defined to be a wind speed less than 0.2 m/sec.) Because of the limited record length, the calculated probability of winds less than or equal to some finite value is sometimes 100 percent. Of course, higher values may actually occur at some future time. Probabilities which were computed for each calendar month (all years combined) make up the rows of each table. The last row in each table gives the average probability of occurrence at the given altitude for a year's time.

For example, the probability that the wind speed does not exceed 12 m/sec at the 200-foot (60.96-meter) level during the month of June is found to be 95.4. This probability means that the wind speed (from whatever direction) is expected to be less than or equal to 12 m/sec about 95.4 percent of the time during June at the 200-foot (60.96-meter) level.

For some purposes (such as structural design), it may be necessary to use the probabilities in table II (which are based on a limited sample) to estimate the probability of occurrence of certain extreme wind conditions over periods of time longer than the sample. The procedure for estimating such a probability is to plot the probability of exceeding a given value of wind speed (obtained by subtracting the values in table II from unity) on a semilogarithmic scale as shown in figure 3(a) for the annual period at the nominal 50-foot (15.24-meter) altitude level. For example, the extrapolated segment of the curve in figure 3(a) shows that the probability of a wind speed exceeding 26 m/sec is 0.0035 (that is, a probability of 0.9965 of being less than or equal to 26 m/sec). Figures 3(b) to 3(e) are similar plots for annual periods at the 100-foot (30.48-meter), 150-foot (45.72-meter), 200-foot (60.96-meter), and 250-foot (76.20-meter) levels, respectively.

By interpolating values in table II and using the extrapolated values from figure 3, speed values corresponding to selected percentiles (often used as design criteria) can be determined for either monthly or annual periods. Because the "windiest" month is a different month for different tower levels and percentiles, it will be left to the reader to compute the percentiles for the combination of month and altitude level most relevant to a particular application. However, the 50.0, 95.0, 99.0, and 99.9 percentiles at each tower

level for an annual period will suffice for many design applications and are presented in table III.

It should be remembered that the wind limits corresponding to various percentiles were based on 15-minute averages and do not represent the peak wind condition associated with gusts. However, values of peak wind speed can be obtained by multiplying the 15-minute average wind speeds by a gust factor (defined to be the ratio of the peak wind speed occurring during an averaging interval to average wind speed during the interval). John W. Kaufman, NASA George C. Marshall Space Flight Center, has carried out preliminary work (unpublished) using data from the 150-meter meteorological tower at Cape Kennedy; on the basis of this work he suggests that the value of gust factor decreases with height and increasing altitude level, but he concludes that a gust factor of 1.4 represents a favorable design value for winds from near the surface to 150 meters. These findings support a gust factor value of 1.4 suggested in reference 6. Until a similar study of the gust characteristics of surface winds at Wallops Island can be made, it is recommended that a gust factor of 1.4 be applied to the percentile values in table III to obtain a peak wind speed. For example, the 99.0-percent wind velocity at the 50-foot (15.24-meter) tower level is 12.8 m/sec and the peak value is 17.9 m/sec.

To define the gust characteristics further (for example, shape and power spectrum) at Wallops Island, fast-response anemometers have been mounted on the 250-foot (76.20-meter) tower at the same tower levels as the aerovanes. Some preliminary data have been published (ref. 7); these data suggest that the wind-speed spectrum could be fitted very well with the -5/3 slope law up to a frequency of 1 cps and agree with the velocity spectrum presented in references 8 and 9. Further information about wind gusts and turbulence at Wallops Island has been obtained as part of a full-scale ground wind loads research program undertaken by Langley Research Center (ref. 10).

Tables IV(a) and IV(b) present the frequency of wind-direction—speed combinations for various averaging periods and altitude levels. Table IV(a) presents empirically determined frequency data for the 250-foot (76.20-meter) altitude level for different calendar months. Table IV(b) presents annual summaries of frequency data for each of five tower levels.

The directions are tabulated in table IV in $22\frac{1}{2}^{\circ}$ increments (that is, by 16 rows in a table), and an additional row is included for specifying the frequency of occurrence of "calm" conditions (no measured wind speed). Each column represents a different speed group. The numerical value at the intersection point of a row or column represents the total number of times that the particular direction and speed group jointly occurred during the calender month represented by the table. By dividing the value at the intersection point of a row or column by the total number of observations listed in each table, the percentage frequency of occurrence of the direction group by speed group can be

obtained. Percentage frequency of occurrence of combinations of several speed and direction groups can be calculated by adding the percentage frequency of occurrences of the individual groups.

The totals of the observations in each column of table IV are also expressed as percentages and indicate the frequency of occurrence of each speed group (independent of direction). Similarly, the row totals are expressed as percentages and indicate the frequency of occurrence of the wind-direction groups (independent of speed). Marginal percentage frequencies of speed groups for a given direction (that is, the percentage frequency with which a wind speed exceeds a given value in a given direction) can be obtained by dividing a particular column entry by the row total.

Statistical Parameters

Table V summarizes some fundamental statistical parameters – magnitude and direction of the vector mean wind, zonal, and meridional components of the means and the standard deviations, and intralevel component correlations – for monthly and annual periods. These parameter values apply to the entire day without regard to the time of day. Values for individual hours of the day are given in table VI. Definitions of the statistical parameters are given in "Treatment of Data." This table is appropriate for applications where the time of day of exposure is not known or is random.

Table VI presents hourly values (Eastern Standard Time) of the following statistical parameters: magnitude and direction of the vector mean wind, the scalar mean, zonal and meridional components of the means and standard deviations, and intralevel component correlations. (These parameters were defined in "Treatment of Data.") Each table permits the expected time of day of the exposure to be taken into account. Values for the lowest and highest tower levels – 50 feet (15.24 meters) and 250 feet (76.20 meters) – are given.

Table VII presents values of the interlevel (zonal to zonal and meridional to meridional) correlation coefficients. Each table presents the computed correlation coefficients between corresponding wind components at the 50-, 100-, 150-, 200-, and 250-foot (15.24-, 30.48-, 45.72-, 60.96-, and 76.20-meter) tower levels for a particular calendar month. The upper half of each table contains parameter values for the zonal (west-to-east) component and the lower half gives values for the meridional (south-to-north) component. For convenience, the mean and standard deviation and the number of observations are also given at each tower level. The number of observations used in computing the interlevel correlation coefficients was never less than the smaller number of observations at the two levels. The correlation coefficients between the zonal (or meridional) components at each tower level are presented in matrix form in the right-hand side of the tables. Since the correlation matrix is symmetric, only the lower triangular form of the matrix is presented.

Most of the values of the correlation coefficients listed in table VII are larger than 0.9; thus, the wind components at the various tower levels are highly correlated (as might be expected over such a short altitude difference and such a large averaging period).

CONCLUDING REMARKS

Ground winds at Wallops Island are important factors in both the design of structures and range operations at NASA Wallops Station. The statistical data included in this report provide the best available information on the low-level wind environment at Wallops Island, Virginia.

Aerovane anemometers mounted at 50-, 100-, 150-, 200-, and 250-foot (15.24-, 30.48-, 45.72-, 60.96-, and 76.20-meter) levels on the 250-foot (76.20-meter) meteorological tower at Wallops Island provided nearly continuous oscillograph recordings of wind speed and directions for a $3\frac{1}{2}$-year period. Fifteen-minute averages of wind speed and direction were read from the oscillograph records at hourly intervals during the $3\frac{1}{2}$-year period. Although the $3\frac{1}{2}$-year period was a limited sample, the estimates of fundamental statistical parameters computed for individual calendar years showed only small year-to-year variations; this result implies that the data included in the sample are relatively homogeneous and indicates that the statistical data given in the body of the report are indeed valid and useful estimates of the long-term values.

The statistical information was divided into two types – frequency-distribution data and statistical parameters. The frequency-distribution data are useful for estimating the probability of certain wind conditions. In addition, the wind-speed limits associated with certain percentiles (50.0, 95.0, 99.0, and 99.9) are useful for design criteria. Because the percentile limits were computed from 15-minute averages of wind speed, it is recommended that a gust factor of 1.4 be used to determine the peak wind speeds needed for design criteria at Wallops Island.

The estimated values of fundamental statistical parameters provide information about the specific properties of the wind distribution. The tabulated parameter values for hourly periods fail to reveal any consistent patterns of diurnal variation. The monthly tabulations of the direction of the vector mean wind θ indicate that the prevailing wind direction is northwesterly during the winter. During the summer, the prevailing wind direction is southerly (reflecting the fact that sea breezes are most common during the late spring and summer months). The tabulated values of the magnitude of the vector mean wind $|\overline{V}_r|$ are small in relation to the values of the component standard deviation σ_X and σ_Y and thus indicate a considerable variability of both speed and direction of surface winds. The tabulated values of the intralevel correlation coefficients

are in most cases small, and many are not significantly different from zero. On the other hand, the values of the interlevel correlation coefficients are large and show that a strong linear relationship exists between winds at the various tower levels.

Langley Research Center,
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Langley Station, Hampton, Va., September 20, 1967,
124-08-04-24-23.

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TABLE I.- YEAR-MONTH SUMMARY OF VALUES OF SELECTED STATISTICAL PARAMETERS DESCRIBING WIND SPEED

[Based on 15-minute averages]

(a) 50-foot (15.24-meter) tower level

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Magnitude of vector mean wind, $\lvert\overline{V}_r\rvert$, m/sec												
1961										0.93	1.49	1.84
1962	1.20	1.53	1.71	2.72	1.22	1.24	1.61	0.93	0.40	.75	2.82	2.85
1963	1.51	2.03	1.34	1.75	1.04	1.42	1.32	1.41	1.37	1.81	1.76	2.60
1964	1.84	2.41	1.38	1.06	.43	2.28	2.13	1.58	1.36	1.21	1.00	2.18
1965	1.58	.85	1.16									
Scalar mean wind $\overline{V}$, m/sec												
1961										5.51	4.34	4.02
1962	5.13	4.49	6.14	6.70	5.47	5.43	5.24	5.23	5.81	5.72	6.66	6.04
1963	4.41	5.23	5.28	5.41	4.60	4.49	3.81	4.12	5.34	5.07	5.40	5.03
1964	5.82	6.05	6.41	5.31	5.33	4.18	4.44	4.42	5.33	4.21	7.12	5.12
1965	5.26	5.31	5.54									
Mean of zonal components, $\frac{\Sigma X}{N}$, m/sec												
1961										0.75	1.22	1.84
1962	1.20	0.63	0.70	1.31	-1.20	-1.00	0.35	-0.70	-0.34	.03	.38	1.89
1963	1.42	1.09	1.14	1.75	-.19	.44	.70	.56	-.60	-.18	1.75	2.07
1964	1.83	2.34	1.23	-.99	.10	.66	.35	-.04	-1.03	.41	.99	2.18
1965	1.05	.85	.66									
Mean of meridional components, $\frac{\Sigma Y}{N}$, m/sec												
1961										-0.54	-0.86	-0.15
1962	-0.08	-1.40	-1.55	2.38	0.26	0.74	1.57	0.61	0.21	-.75	-2.80	-2.13
1963	-.52	-1.71	.71	.16	1.02	1.35	1.12	1.29	-1.23	-1.80	.06	-1.56
1964	.22	-.56	.63	.37	.42	2.18	2.10	1.58	-.89	-1.13	.05	.10
1965	-1.18	-.05	-.95									
Direction of vector mean wind, θ, deg												
1961										306	305	275
1962	274	336	336	209	102	127	193	131	122	357	352	318
1963	290	327	238	265	169	198	212	203	26	6	268	307
1964	263	283	243	111	194	197	189	179	49	340	267	267
1965	318	273	325									
Standard deviation of zonal components, σ_X, m/sec												
1961										3.78	3.51	3.02
1962	2.81	3.32	4.26	4.20	3.70	3.42	3.68	3.44	3.87	4.39	4.48	4.42
1963	2.84	3.12	3.75	4.01	3.18	3.41	2.52	2.85	2.94	3.36	4.41	3.48
1964	4.81	4.76	4.24	3.80	3.80	2.48	2.39	3.19	3.87	3.34	3.70	2.31
1965	3.38	4.48	4.59									
Standard deviation of meridional components, σ_Y, m/sec												
1961										5.10	3.35	3.20
1962	4.97	3.77	5.54	5.06	4.34	4.68	3.94	4.27	4.88	4.10	5.28	4.49
1963	4.00	4.30	4.34	4.31	3.90	3.56	3.13	3.42	4.89	4.28	4.05	3.55
1964	4.30	4.15	5.44	4.38	4.33	3.26	3.65	3.49	4.32	3.34	4.02	4.63
1965	4.68	4.28	3.90									
Correlation of zonal and meridional components, r_{XY}												
1961										0.252	-0.518	-0.220
1962	0.097	-0.139	0.108	-0.148	0.394	0.612	0.140	0.177	0.226	.126	.345	.221
1963	-.259	.051	.111	-.359	.117	.148	.153	.070	.349	.525	-.152	.038
1964	.196	-.015	-.211	.329	.476	.123	.271	.393	.431	.295	.039	.123
1965	.408	.085	.054									

TABLE I.- YEAR-MONTH SUMMARY OF VALUES OF SELECTED STATISTICAL PARAMETERS DESCRIBING WIND SPEED – Concluded

[Based on 15-minute averages]

(b) 250-foot (76.20-meter) tower level

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Magnitude of vector mean wind, $\lvert\overline{V}_r\rvert$, m/sec												
1961										1.46	1.84	2.81
1962	1.29	1.23	1.68	3.76	1.26	1.43	2.04	1.04	0.31	.77	3.47	3.86
1963	2.26	2.31	2.89	2.72	1.81	2.31	2.35	2.44	1.67	2.47	2.57	3.60
1964	4.71	3.72	2.63	1.48	.43	2.94	2.77	1.42	1.31	1.61	1.44	2.90
1965	2.36	2.19	1.53									
Scalar mean wind $\overline{V}$, m/sec												
1961										8.01	7.73	6.39
1962	7.73	6.02	8.30	8.41	6.08	6.03	5.74	5.45	6.41	6.56	8.72	8.71
1963	6.84	7.20	8.43	8.03	6.67	6.24	6.13	6.22	7.20	7.13	8.18	7.21
1964	9.14	8.63	9.11	7.57	7.62	6.71	7.24	5.43	7.03	6.20	5.01	7.63
1965	8.12	8.19	6.94									
Mean of zonal components, $\frac{\Sigma X}{N}$, m/sec												
1961										1.42	1.68	2.76
1962	1.26	0.27	0.80	1.08	-0.87	-0.87	0.32	-0.92	-0.25	.44	.38	2.73
1963	2.20	1.44	2.23	2.62	-.01	1.08	1.52	1.25	-.38	-.08	2.52	3.28
1964	3.94	3.65	2.08	-.74	.38	1.13	.73	-.52	-.68	.74	1.36	2.43
1965	2.12	1.96	1.02									
Mean of meridional components, $\frac{\Sigma Y}{N}$, m/sec												
1961										-0.34	-0.76	-0.55
1962	0.21	-1.20	-1.47	3.60	0.91	1.14	2.02	0.49	0.19	-.63	-3.45	-2.72
1963	-.50	-1.80	1.83	.69	1.81	2.03	1.80	2.09	-1.63	-2.46	.48	-1.48
1964	2.58	-.72	1.61	1.28	-.21	2.72	2.67	1.32	-1.118	-1.43	.49	1.58
1965	-1.04	.97	-1.14									
Direction of vector mean wind, θ, deg												
1961										284	294	281
1962	260	347	331	197	136	143	189	118	127	325	354	315
1963	283	321	231	256	179	208	220	211	13	2	259	294
1964	237	281	232	150	300	203	195	158	32	333	250	237
1965	296	244	318									
Standard deviation of zonal components, σ_X, m/sec												
1961										5.07	5.44	4.08
1962	5.09	4.16	5.38	4.96	4.07	3.37	3.87	3.61	4.00	5.25	5.59	6.08
1963	4.11	4.36	5.15	5.54	4.38	4.57	3.90	3.89	3.94	4.54	6.20	5.03
1964	5.77	6.57	5.50	5.21	5.44	3.98	4.22	3.88	4.74	4.52	4.95	3.93
1965	4.76	6.34	5.59									
Standard deviation of meridional components, σ_Y, m/sec												
1961										7.08	6.11	5.32
1962	7.15	5.54	7.88	6.82	5.02	5.92	4.74	4.75	5.72	4.75	7.07	6.53
1963	5.96	5.96	6.96	6.29	5.76	4.90	4.74	5.14	6.73	5.96	6.03	4.86
1964	6.62	5.54	7.87	6.42	6.08	5.28	5.98	4.48	5.95	5.12	5.85	6.89
1965	7.09	6.58	5.12									
Correlation of zonal and meridional components, r_{XY}												
1961										0.260	-0.536	-0.133
1962	0.229	-0.009	-0.013	-0.291	0.237	0.469	0.019	0.067	0.210	.147	.295	.251
1963	-.087	.095	.141	-.307	.102	.184	.159	.027	.320	.482	-.125	.043
1964	.046	-.032	-.157	.304	.572	.246	.224	.173	.478	.236	-.002	-.343
1965	.253	-.077	.089									

TABLE II.- PERCENTAGE PROBABILITY OF WIND SPEED BEING LESS THAN OR EQUAL TO GIVEN VALUE

[Based on 15-minute averages]

Month	Percentage probability of wind speed (m/s) being less than or equal to –										
	Calm	2	4	6	8	10	12	14	16	18	20
					50-foot (15.24-meter) tower level						
Jan.	2.6	19.0	49.5	69.8	86.2	94.7	98.3	99.6	100		
Feb.	2.2	18.6	49.1	69.4	87.4	95.0	98.4	99.6	99.9	100	
March	.9	9.9	40.3	63.8	84.2	93.1	97.7	98.9	99.2	99.5	99.6
April	.8	10.3	35.7	61.7	85.9	94.2	98.1	99.4	99.8	100	
May	.9	12.1	31.4	72.6	93.6	98.9	99.7	100			
June	1.7	15.7	52.6	79.6	93.6	98.3	99.3	99.8	99.8	99.9	100
July	1.2	16.5	57.3	82.6	96.3	99.6	100				
Aug.	3.0	16.2	54.2	81.7	96.4	99.1	99.7	100			
Sept.	1.2	9.7	43.9	68.6	89.4	96.4	98.7	99.7	99.9	100	
Oct.	1.4	13.5	51.2	75.1	90.8	96.2	98.6	99.5	99.8	99.9	100
Nov.	2.4	14.7	49.2	69.8	84.6	93.4	97.5	99.2	99.7	100	
Dec.	2.8	17.6	50.3	72.2	88.8	95.8	97.8	99.2	99.6	100	
Annual	1.8	14.5	47.7	71.8	89.3	96.0	98.6	99.6	99.8	99.9	99.9
					100-foot (30.48-meter) tower level						
Jan.	1.5	8.9	31.4	55.0	76.1	88.0	94.6	97.7	99.2	99.7	100
Feb.	1.5	10.7	33.7	55.7	78.1	89.8	95.9	98.6	99.4	99.7	100
March	.5	6.4	27.3	50.4	73.7	86.9	94.6	98.3	98.9	99.5	99.6
April	.8	7.2	26.9	51.3	79.2	89.8	95.8	98.8	99.6	100	
May	.9	7.6	33.1	58.1	84.8	95.6	99.0	100			
June	2.3	10.7	38.5	64.7	86.1	96.1	98.8	99.4	99.6	99.7	99.8
July	1.1	10.6	42.4	71.7	91.6	98.1	99.7	100			
Aug.	1.1	12.3	46.7	73.9	91.7	98.2	99.4	99.9	100		
Sept.	.5	6.7	33.2	61.5	82.4	90.6	97.5	99.5	99.9	100	
Oct.	1.2	8.1	33.8	65.8	85.6	93.0	96.7	98.6	99.4	99.7	100
Nov.	1.2	8.2	32.9	60.3	78.1	88.3	95.1	98.4	99.4	99.9	100
Dec.	1.5	10.3	35.7	60.4	80.6	81.4	96.4	98.6	99.5	99.7	100
Annual	1.2	9.0	34.4	60.4	81.9	91.9	96.8	99.0	99.7	99.8	99.9
					150-foot (45.72-meter) tower level						
Jan.	1.5	7.7	25.0	44.2	66.3	80.9	90.5	96.3	98.3	99.7	100
Feb.	1.4	7.5	25.1	46.7	70.4	84.2	92.5	97.3	98.8	99.7	99.8
March	1.0	4.4	20.1	42.7	66.3	81.0	90.0	96.2	98.1	98.9	99.2
April	.8	6.0	21.0	42.5	66.8	83.6	92.3	97.4	99.0	99.8	100
May	1.1	6.7	27.2	49.4	73.8	90.3	97.5	99.5	99.9	100	
June	2.4	10.7	32.5	56.6	78.5	92.1	97.4	99.4	99.7	99.8	99.8
July	1.2	7.3	29.0	54.9	81.9	92.4	98.2	99.9	100		
Aug.	.8	8.4	33.9	62.4	84.9	95.4	98.7	99.6	99.9	100	
Sept.	1.7	9.3	32.7	57.9	80.9	89.5	95.9	98.9	99.7	99.9	100
Oct.	1.8	9.1	31.1	61.0	84.9	93.7	97.8	99.0	99.3	99.7	99.8
Nov.	1.6	7.4	25.0	50.6	72.2	84.9	92.8	97.3	98.6	99.8	100
Dec.	1.6	7.9	27.7	50.3	74.4	88.3	95.5	98.9	99.5	99.8	99.9
Annual	1.4	7.6	27.2	51.1	74.5	87.5	94.5	98.0	99.0	99.6	99.8
					200-foot (60.96-meter) tower level						
Jan.	1.4	5.8	20.9	37.9	60.3	75.7	87.3	95.3	97.9	99.3	99.9
Feb.	1.4	6.6	22.3	40.5	65.1	81.4	91.1	97.2	98.5	99.5	99.8
March	.5	3.4	16.1	33.8	57.6	73.6	85.9	93.8	97.0	98.3	99.3
April	.5	4.1	16.2	32.9	58.2	76.8	86.9	94.4	97.7	99.5	99.9
May	.6	3.8	19.5	41.4	70.3	87.5	96.6	99.4	99.8	100	
June	.8	7.3	25.7	47.9	72.7	87.4	95.4	98.9	99.6	99.8	100
July	1.5	7.0	27.6	55.6	81.1	92.5	97.9	99.8	100		
Aug.	1.6	9.4	37.0	64.3	86.0	95.6	98.4	99.8	100		
Sept.	1.3	4.7	23.1	49.4	77.2	78.5	94.1	98.2	99.0	99.9	100
Oct.	1.4	5.2	22.7	46.7	76.1	89.8	94.6	97.4	98.6	99.4	99.7
Nov.	1.5	5.4	19.4	39.1	66.0	79.3	88.6	95.3	97.3	99.3	99.8
Dec.	1.0	6.3	22.3	41.6	66.6	81.4	91.0	97.0	98.5	99.5	99.7
Annual	1.1	5.7	22.5	43.7	69.1	83.5	91.9	97.0	98.5	99.4	99.7
					250-foot (76.20-meter) tower level						
Jan.	1.8	6.9	22.3	37.7	59.4	75.7	87.5	95.3	97.3	98.8	99.6
Feb.	1.3	8.6	23.7	41.1	65.7	80.5	88.8	95.3	97.6	98.9	99.6
March	1.1	5.3	19.2	37.1	60.7	75.5	86.1	93.5	96.5	98.1	99.1
April	.6	5.1	17.8	35.4	61.7	77.5	87.4	93.9	97.3	99.7	99.9
May	1.3	6.2	24.1	46.7	73.0	88.4	96.5	99.3	100		
June	3.3	10.6	31.9	55.0	76.7	90.3	96.2	98.6	99.4	99.5	99.6
July	1.6	7.8	30.5	55.1	81.2	91.7	96.6	99.6	100		
Aug.	1.9	9.8	37.6	54.4	85.7	95.0	97.8	99.5	99.7	100	
Sept.	1.7	6.4	25.3	48.8	74.5	86.0	93.1	98.3	99.1	100	
Oct.	2.3	7.4	24.9	47.4	74.9	89.5	94.1	97.5	99.1	99.6	99.8
Nov.	1.1	5.8	18.7	36.0	61.7	77.8	87.8	95.0	97.7	99.1	99.9
Dec.	1.4	8.0	23.0	41.2	65.6	79.2	89.9	96.3	98.6	99.7	99.9
Annual	1.6	7.3	24.6	44.8	69.4	83.5	91.5	96.7	98.4	99.4	99.8

TABLE III.- WIND-SPEED LIMITS FOR SELECTED PERCENTILES

[Based on 15-minute averages]

Nominal tower level,		Wind speed limits, m/sec for percentiles of –			
Feet	Meters	50.0	95.0	99.0	99.9
50	15.24	4.19	9.70	12.80	18.00
100	30.48	5.19	11.26	14.00	20.00
150	45.72	5.90	12.29	16.00	21.50
200	60.96	6.50	13.21	17.11	22.80
250	76.20	6.42	13.34	17.20	22.00

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS

[Based on 15-minute averages]

(a) 250-foot (76.20-meter) tower level

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
January														
N	8	50	58	70	31	17	11	2				247	9.0	6.9
NNE	6	28	23	30	13	9	12	5	6		2	134	4.9	8.1
NE	15	45	20	29	18	13	8	2	1			151	5.5	6.5
ENE	17	18	13	12	16	9	4		1	2		92	3.4	6.7
E	10	17	12	8	7	7				1		62	2.3	6.0
ESE	3	9	2	3	10	3	2	3	1			36	1.3	8.1
SE	6	11	10	6	2	4	1		1			41	1.5	6.0
SSE	4	12	11	17	11	6	4	1	9	3		78	2.8	8.9
S	10	15	22	28	34	32	19	7	11	10	7	195	7.1	10.3
SSW	4	20	24	74	68	63	36	6	3	4		302	11.0	9.4
SW	5	18	13	68	81	64	44	7	2			302	11.0	9.6
WSW	12	19	23	33	27	33	17	2				166	6.0	8.2
W	12	30	35	24	16	10	7	7	4			145	5.3	7.2
WNW	7	27	26	42	26	5	19	8	1			161	5.9	7.9
NW	13	55	62	71	57	37	27	4	2	2		330	12.0	7.7
NNW	9	48	69	82	31	12	4	1				256	9.3	6.6
Calm												48	1.7	
Total	141	422	423	597	448	324	215	55	42	22	9	2746		7.9
Percent	5.1	15.4	15.4	21.7	16.3	11.8	7.8	2.0	1.5	0.8	0.3		100.0	
February														
N	16	32	48	50	13	11	5	1	1			177	7.0	6.4
NNE	9	12	40	42	20	5	1	1	1	3	1	135	5.3	7.1
NE	5	23	28	50	18	6		3	1	1		135	5.3	7.0
ENE	3	16	14	26	16	10	5	1	1	1	1	94	3.7	8.0
E	7	26	26	21	17	5	2	8	6	1		119	4.7	7.6
ESE	9	19	10	13	2	1	2	5	1	2		64	2.5	6.5
SE	18	21	7	3	2	4	8	4	3			70	2.8	6.4
SSE	9	20	14	13	3	3	3	2	3	5		75	3.0	7.2
S	10	18	26	42	32	10	9	3	1	2	1	154	6.1	7.8
SSW	10	31	23	35	46	39	27	5			1	217	8.6	8.6
SW	14	19	21	41	30	13	11	1	2	1	3	156	6.2	7.8
WSW	15	25	21	40	16	10	16	5	3			151	6.0	7.5
W	25	31	33	38	24	18	15					184	7.3	6.8
WNW	10	31	40	65	35	28	19	5	2	1		236	9.3	7.9
NW	16	16	54	100	54	32	12	9	7	1		301	11.9	8.2
NNW	9	41	39	43	46	32	11	4	2			227	9.0	7.7
Calm												34	1.3	
Total	185	381	444	622	374	227	146	57	34	18	7	2529		7.5
Percent	7.3	15.1	17.6	24.6	14.8	9.0	5.8	2.3	1.3	0.7	0.3		100.0	
March														
N	8	39	53	50	12	12	5	2		3	6	190	6.9	7.3
NNE	11	23	22	36	8	4	1			1	8	114	4.2	7.5
NE	13	29	22	25	25	13	7	5	2	5		146	5.3	7.7
ENE	8	24	23	35	23	23	9	2			1	148	5.4	7.7
E	7	32	19	25	9	5	7	7	6	1	1	119	4.3	7.7
ESE	9	17	14	6	2	2	2	2	1			55	2.0	5.7
SE	6	21	17	12	7	1	3	1				68	2.5	5.9
SSE	8	28	22	17	7	6	4	7	7	4	3	113	4.1	8.1
S	8	27	34	49	48	52	47	19	12	6	9	311	11.3	10.1
SSW	3	15	16	40	51	61	37	15	9	5		252	9.2	10.4
SW	6	8	33	46	32	20	16	6		2	1	170	6.2	8.6
WSW	5	10	20	24	14	4	2	2	1		1	83	3.0	7.4
W	10	29	47	54	31	7	4	1				183	6.7	6.8
WNW	5	26	40	65	52	36	23	7	1			255	9.3	8.5
NW	3	31	60	91	56	30	23	5	2			301	11.0	8.1
NNW	5	22	48	72	28	14	12	2	2	1		206	7.5	7.6
Calm												31	1.1	
Total	115	381	490	647	405	290	202	83	43	28	30	2745		8.1
Percent	4.2	13.9	17.9	23.6	14.8	10.6	7.4	3.0	1.6	1.0	1.1		100.0	

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS – Continued

[Based on 15-minute averages]

(a) 250-foot (76.20-meter) tower level – Continued

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
April														
N	5	12	16	19	12	1	1					66	3.2	6.3
NNE	5	12	21	27	14	3	4					86	4.1	6.9
NE	4	9	11	37	28	5	2	1				97	4.7	7.7
ENE	5	8	28	45	14	3						103	4.9	6.8
E	10	28	37	20	2	4						101	4.8	5.4
ESE	7	29	33	16	2	2	3					92	4.4	5.4
SE	7	25	15	21	13	10	9		1			101	4.8	7.1
SSE	5	18	28	29	20	22	21	12	10	1	3	169	8.1	9.6
S	7	19	35	65	52	40	36	28	20	1		303	14.5	10.0
SSW	2	8	22	36	40	30	13	8	2			161	7.7	9.2
SW	3	19	13	38	24	22	10	9	5			143	6.9	8.9
WSW	6	11	18	27	5	14	4	3	2	1		91	4.4	7.9
W	8	19	27	45	25	5	5	1				135	6.5	7.0
WNW	7	18	15	46	37	19	14		3			159	7.6	8.3
NW	9	17	31	54	35	23	12	8	7	2		198	9.5	8.5
NNW	3	13	17	22	7	3	1					66	3.2	6.7
Calm												12	.6	
Total	93	265	367	547	330	206	135	70	50	5	3	2083		8.0
Percent	4.5	12.7	17.6	26.3	15.8	9.9	6.5	3.4	2.4	0.2	0.1		100.0	
May														
N	9	21	26	31	5	2						94	4.4	5.7
NNE	5	24	25	32	28	10	1					125	5.8	7.0
NE	10	29	46	86	44	37	17	2				271	12.6	7.8
ENE	3	17	45	56	18	2						141	6.6	6.6
E	3	44	52	21	4							124	5.8	5.2
ESE	13	34	19	2								68	3.2	3.8
SE	13	40	24	18	5	5	4	1				110	5.1	5.5
SSE	11	34	35	29	11	4	5	1				130	6.0	6.0
S	5	26	33	85	59	30	14	3				255	11.9	8.1
SSW	2	11	32	48	62	36	15	2	1	1		210	9.8	8.8
SW	6	25	27	39	38	14		1				150	7.0	7.3
WSW	4	12	30	20	13	4						83	3.9	6.5
W	6	30	41	38	16	3						134	6.2	6.1
WNW	5	11	13	21	11	14	3					78	3.6	7.5
NW	6	14	20	20	11	14	1					86	4.0	6.9
NNW	5	13	18	20	5		1					62	2.9	5.8
Calm												28	1.3	
Total	106	385	486	566	330	175	61	10	1	1		2149		6.8
Percent	4.9	17.9	22.6	26.3	15.4	8.1	2.8	0.5					100.0	
June														
N	6	18	14	10	9	2						59	2.8	5.6
NNE	6	16	13	12	17	6	11	4				85	4.1	7.9
NE	3	23	41	45	37	8	2	1		1	2	163	7.8	7.4
ENE	5	27	17	17	7	6	6	2			2	89	4.2	6.9
E	16	43	12	5	5	5					1	87	4.2	4.7
ESE	16	29	14					1				60	2.9	3.7
SE	21	36	12	11	2		1	1				84	4.0	4.3
SSE	14	35	32	20	16	9	3	3				132	6.3	6.2
S	12	38	65	75	85	43	23	4	2			347	16.6	8.0
SSW	7	33	56	72	66	36	4	1	1			276	13.2	7.6
SW	13	31	48	69	19	3	1					184	8.8	6.3
WSW	6	45	28	34	5							118	5.6	5.4
W	10	46	55	46	2	2				1		162	7.7	5.5
WNW	5	21	17	13	4							60	2.9	5.3
NW	4	17	29	10	1	2						63	3.0	5.3
NNW	8	10	10	16	11	2						57	2.7	6.1
Calm												70	3.3	
Total	152	468	463	455	286	124	51	17	3	2	5	2096		6.3
Percent	7.3	22.3	22.1	21.7	13.6	5.9	2.4	0.8	0.1	0.1	0.2		100.0	

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS – Continued

[Based on 15-minute averages]

(a) 250-foot (76.20-meter) tower level – Continued

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
							July							
N	10	38	23	12	8	3						94	4.7	5.1
NNE	1	20	11	15	14	5	4					70	3.5	7.0
NE	7	15	13	21	14	14	6	1				91	4.5	7.5
ENE	4	19	17	22	7		1					70	3.5	6.0
E	4	29	27	14	2							76	3.8	5.1
ESE	14	17	9	9		3	4					56	2.8	5.1
SE	20	45	24	13	3	2						107	5.3	4.4
SSE	7	31	46	39	9	5	3					140	7.0	6.1
S	5	49	56	90	62	39	38	4				343	17.1	8.1
SSW	10	16	38	62	38	19	5					188	9.4	7.4
SW	7	32	41	85	20	1						186	9.3	6.5
WSW	3	47	68	42	9	1						170	8.5	5.7
W	12	49	77	36	4			1				179	8.9	5.3
WNW	9	24	15	19	5	4						76	3.8	5.6
NW	4	11	19	26	9	3						72	3.6	6.6
NNW	7	13	9	17	6							52	2.6	5.6
Calm												33	1.6	
Total	124	455	493	522	210	99	61	6				2003		6.3
Percent	6.2	22.7	24.6	26.1	10.5	4.9	3.0	0.3					100.0	
							August							
N	4	21	29	32	9		1					96	4.7	6.0
NNE	6	13	20	17	2	1						59	2.9	5.5
NE	10	23	24	27	32							116	5.7	6.3
ENE	12	27	51	17	9	7	8	2				133	6.5	6.2
E	18	64	43	15								140	6.9	4.3
ESE	25	65	7	2	5							104	5.1	3.6
SE	12	74	24	10	4							124	6.1	4.4
SSE	4	40	76	51	23	5						199	9.7	6.1
S	13	43	77	73	48	18	7					279	13.7	6.8
SSW	12	35	30	39	20	16	13	3				168	8.2	7.2
SW	6	35	38	31	16	5	1				1	133	6.5	6.2
WSW	6	35	19	18	3	1	1					83	4.1	5.2
W	16	35	29	27	2	3						112	5.5	5.2
WNW	7	17	18	17	5		1		3			68	3.3	6.2
NW	4	20	32	25	9	1	3			1		95	4.7	6.2
NNW	7	20	31	34	4							96	4.7	5.7
Calm												38	1.9	
Total	162	567	548	435	191	57	35	5	3	1	1	2043		5.7
Percent	7.9	27.8	26.8	21.3	9.3	2.8	1.7	0.2	0.1				100.0	
							September							
N	7	18	33	77	69	21	21	1				247	11.7	8.2
NNE	10	19	17	25	15	25	54	6	6			177	8.4	9.7
NE	6	20	34	50	34	18	15	3	7			187	8.9	8.3
ENE	8	28	50	24	5	17		1	1			134	6.4	6.3
E	16	49	56	16	1	3						141	6.7	4.7
ESE	10	49	16	6	1	2	1					85	4.0	4.3
SE	5	34	20	5		1	1					66	3.1	4.6
SSE	5	20	11	24	4	1		1	1			67	3.2	6.0
S	6	20	27	78	45	19	8	3	2		1	209	9.9	8.0
SSW	4	11	38	49	46	11	9	2				170	8.1	7.9
SW	6	23	29	62	9		1					130	6.2	6.3
WSW	3	30	33	26	2	1						95	4.5	5.5
W	3	32	47	19	2	2						105	5.0	5.4
WNW	1	11	27	17	8							64	3.0	6.1
NW	4	17	32	23	2							78	3.7	5.6
NNW	5	17	24	39	21	8						114	5.4	6.9
Calm												35	1.7	
Total	99	398	494	540	264	129	110	17	17		1	2104		6.9
Percent	4.7	18.9	23.5	25.7	12.5	6.1	5.2	0.8	0.8				100.0	

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS – Continued

[Based on 15-minute averages]

(a) 250-foot (76.20-meter) tower level – Concluded

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
October														
N	5	14	63	89	42	6	9	7				235	9.5	7.6
NNE	3	24	33	63	38	20	29	9	1			220	8.9	8.6
NE	12	50	61	52	22	14	18	13	4	1	1	248	10.0	7.4
ENE	7	38	46	30	14	8	1	2	8	3	3	160	6.5	7.3
E	8	30	33	4	9	4	3			2	2	95	3.8	6.2
ESE	7	16	10	1								34	1.4	3.8
SE	6	25	7	2	4	2						46	1.9	4.7
SSE	11	20	12	6	2		2					53	2.1	4.6
S	9	38	43	47	39	7	2					185	7.5	6.6
SSW	9	27	41	57	53	16	12					215	8.7	7.5
SW	13	25	39	63	26	10						176	7.1	6.7
WSW	18	27	26	41	18	1						131	5.3	5.7
W	8	39	28	52	17	4	1					149	6.0	6.2
WNW	3	24	25	53	16	11	3	2				137	5.5	7.1
NW	5	14	42	63	35	8	1					168	6.8	7.2
NNW	2	22	49	60	26	3	3	7				172	6.9	7.2
Calm												56	2.3	
Total	126	433	558	683	361	114	84	40	13	6	6	2480		6.8
Percent	5.1	17.5	22.5	27.5	14.6	4.6	3.4	1.6	0.5	0.2	0.2		100.0	
November														
N	8	21	42	70	15	6	9	3	1			175	6.1	7.1
NNE	4	26	37	22	17	32	34	13	4	6		195	6.8	9.5
NE	15	20	21	25	15	8	12	13	4			133	4.6	7.9
ENE	14	31	21	18	13	7	6	2	2		2	116	4.0	6.6
E	15	19	15	22	16	7	8	4	2	1	2	111	3.9	7.5
ESE	16	16	17	5	5	8	6	6	5	6	2	92	3.2	8.4
SE	6	15	7	12	13	4	5	2		1		65	2.3	7.3
SSE	7	13	23	27	20	19	8	2	2	1		122	4.3	8.1
S	12	24	44	82	49	17	21	11	3	1		264	9.2	8.1
SSW	2	23	27	83	44	28	17	5	2			231	8.1	8.4
SW	5	26	35	44	32	15	11					168	5.9	7.5
WSW	9	23	21	23	8	13	3	4	5			109	3.8	7.4
W	8	23	33	19	12	17	11	1	2			126	4.4	7.4
WNW	5	33	48	46	58	40	36	6	5	3	1	281	9.8	8.9
NW	6	29	70	138	96	47	14	3	3			406	14.2	8.1
NNW	3	28	36	99	48	18	5	2				239	8.3	7.6
Calm												32	1.1	
Total	135	370	497	735	461	286	206	77	40	19	7	2865		7.9
Percent	4.7	12.9	17.3	25.7	16.1	10.0	7.2	2.7	1.4	0.7	0.2		100.0	
December														
N	15	50	60	62	16	13	1					217	8.1	6.1
NNE	16	34	39	28	11	44	38	2				212	8.0	8.1
NE	11	19	16	7	8	9	4	1	2			77	2.9	6.6
ENE	7	11	7	2		2	5	1	1	1		37	1.4	6.7
E	12	15	4	4		2	4		1			42	1.6	5.1
ESE	11	7	5	2	6	3	2					36	1.4	5.6
SE	17	9	12	14	3		2	1	1			59	2.2	5.3
SSE	9	15	5	8	10	2	2	2				53	2.0	6.3
S	14	20	41	64	51	36	25	8				259	9.7	8.3
SSW	5	25	31	54	31	26	4	6	2			184	6.9	7.9
SW	7	25	34	49	26	18	12	11	2			184	6.9	8.0
WSW	13	17	22	39	28	15	18	4	1			157	5.9	7.9
W	8	39	41	53	27	18	6	1	1			194	7.3	7.0
WNW	12	29	35	73	47	30	19	13	6	4	1	269	10.1	8.6
NW	7	36	82	140	91	28	27	10	13	3	5	442	16.6	8.5
NNW	11	48	50	50	33	11	2					205	7.7	6.4
Calm												36	1.4	
Total	175	399	484	649	388	257	171	60	30	8	6	2663		7.5
Percent	6.6	15.0	18.2	24.4	14.6	9.7	6.4	2.3	1.1	0.3	0.2		100.0	

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS – Continued

Based on 15-minute averages

(b) Annual period

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
50-foot (15.24-meter) tower level														
N	318	778	480	277	99	37	6	2	3	2	1	2 003	6.9	4.8
NNE	182	534	365	329	198	78	31	12	2		9	1 740	6.0	5.9
NE	132	359	305	434	238	98	33	7	1			1 607	5.5	6.5
ENE	111	330	373	315	139	36	23	10	9	4		1 350	4.7	6.1
E	142	440	317	146	59	33	20	4	1	1		1 163	4.0	5.1
ESE	177	336	149	94	12	15	4	1	3			791	2.7	4.3
SE	257	361	144	73	13	3	6	1				858	3.0	3.8
SSE	180	442	280	156	46	18	5	2				1 129	3.9	4.7
S	203	816	967	755	164	44	25	5				2 979	10.3	5.6
SSW	240	1065	1087	642	161	35	6	1				3 237	11.2	5.3
SW	289	941	498	282	101	38	10	2	6	1		2 168	7.5	4.8
WSW	328	553	263	178	74	39	20	5				1 460	5.0	4.6
W	330	659	363	244	101	37	4		1			1 739	6.0	4.7
WNW	249	566	367	325	181	90	27	8	6			1 819	6.3	5.6
NW	286	769	551	450	223	106	43	9	3			2 440	8.4	5.6
NNW	264	694	492	380	124	35	18	3				2 010	6.9	5.1
Calm												523	1.8	
Total	3688	9643	7001	5080	1933	742	281	72	35	8	10	29 016		5.2
Percent	12.7	33.2	24.1	17.5	6.7	2.6	1.0	0.2	0.1				100.0	
100-foot (30.48-meter) tower level														
N	162	587	680	390	163	65	25	4				2 076	7.2	5.6
NNE	147	434	401	318	235	175	82	15	9	2	2	1 820	6.3	6.7
NE	101	334	356	384	205	156	68	21	17	2	11	1 655	5.7	7.2
ENE	107	268	317	331	207	91	35	17	14	8	3	1 398	4.8	6.8
E	118	388	337	227	81	42	20	8	3	4		1 228	4.2	5.6
ESE	129	352	185	83	33	16	9	3	1			811	2.8	4.7
SE	232	396	173	74	37	14	11	2	1	1		941	3.2	4.2
SSE	153	406	277	158	37	13	14	2	1			1 061	3.7	4.8
S	125	516	764	929	396	139	56	24	6	1		2 956	10.2	6.7
SSW	114	498	952	1072	467	155	41	5	1			3 305	11.4	6.7
SW	149	566	697	520	158	46	41	6	4	5	2	2 194	7.6	5.9
WSW	138	493	337	187	98	69	29	7	1			1 359	4.7	5.5
W	160	609	460	264	122	77	26	17	4			1 739	6.0	5.6
WNW	120	474	380	316	164	112	60	18	7	5	1	1 657	5.7	6.4
NW	166	541	657	596	323	190	87	32	7			2 599	9.0	6.7
NNW	139	514	557	381	165	72	23	9	2			1 862	6.4	5.8
Calm												342	1.2	
Total	2260	7376	7530	6230	2891	1432	627	190	78	28	19	29 003		6.1
Percent	7.8	25.4	26.0	21.5	10.0	4.9	2.2	0.7	0.3	0.1	0.1		100.0	
150-foot (45.72-meter) tower level														
N	109	414	624	434	163	72	17	8	3			1 844	6.5	6.1
NNE	77	371	425	356	175	161	66	10	12	1	13	1 667	5.8	6.9
NE	99	318	345	396	271	214	117	42	13	4		1 819	6.4	7.6
ENE	97	270	328	366	236	133	43	17	18	5	5	1 518	5.3	7.1
E	101	328	387	279	95	39	45	11	10	4	3	1 302	4.6	6.1
ESE	107	350	197	67	48	21	18	15	4	1		828	2.9	5.0
SE	329	359	148	93	31	27	18	4	9			1 018	3.6	4.3
SSE	148	350	299	196	54	27	18	10	3	1		1 106	3.9	5.3
S	109	366	588	819	564	296	138	37	23	7		2 947	10.3	7.7
SSW	84	302	563	890	729	300	155	41	9	1		3 074	10.8	7.9
SW	88	362	588	678	286	150	69	12	10	2	5	2 250	7.9	7.0
WSW	81	331	405	274	129	61	50	18	10	7	1	1 367	4.8	6.5
W	105	446	489	384	164	96	46	13	5	1		1 749	6.1	6.2
WNW	86	324	359	319	189	114	78	9	8	1		1 487	5.2	6.8
NW	87	363	532	663	359	227	97	31	22	7	3	2 391	8.4	7.4
NNW	70	348	558	479	213	73	29	6	6	1		1 783	6.2	6.5
Calm												398	1.4	
Total	1777	5602	6835	6693	3706	2011	1004	284	165	43	30	28 548		6.7
Percent	6.2	19.6	23.9	23.4	13.0	7.0	3.5	1.0	0.6	0.2	0.1		100.0	

TABLE IV.- FREQUENCY OF SPEED-DIRECTION COMBINATIONS – Concluded

[Based on 15-minute averages]

(b) Annual period – Concluded

Direction	Frequency at speeds of –											Number of observations	Percent of total	Mean speed, m/sec
	1 to 2 m/sec	3 to 4 m/sec	5 to 6 m/sec	7 to 8 m/sec	9 to 10 m/sec	11 to 12 m/sec	13 to 14 m/sec	15 to 16 m/sec	17 to 18 m/sec	19 to 20 m/sec	Above 21 m/sec			
200-foot (60.96-meter) tower level														
N	72	311	503	543	216	108	40	12	1	1		1 807	6.3	6.7
NNE	80	255	338	375	197	85	84	25	15	5	14	1 473	5.2	7.3
NE	68	243	323	440	307	205	181	54	50	10		1 881	6.6	8.3
ENE	62	258	300	351	231	108	68	9	19	10	10	1 426	5.0	7.4
E	94	280	376	267	99	58	49	19	15	11	6	1 274	4.5	6.6
ESE	121	331	193	100	40	21	16	9	7			838	2.9	5.1
SE	196	382	192	96	33	32	12	1	7	1		952	3.3	4.7
SSE	81	350	252	179	96	46	28	17	10	2	1	1 062	3.7	6.1
S	89	345	471	739	481	364	199	74	42	20	4	2 828	9.9	8.3
SSW	70	254	456	831	800	466	266	62	24	8		3 237	11.3	8.6
SW	63	293	487	731	387	195	92	18	7	3	4	2 280	8.0	7.5
WSW	81	279	363	445	153	102	53	22	9		1	1 508	5.3	6.9
W	61	360	489	428	192	110	60	22	12	1		1 735	6.1	6.8
WNW	52	273	368	421	212	136	102	32	6	2		1 604	5.6	7.4
NW	76	279	471	744	440	245	155	48	36	14	10	2 518	8.8	8.1
NNW	51	308	479	568	241	122	42	9	7	2	1	1 830	6.4	6.9
Calm												324	1.1	
Total	1317	4801	6061	7258	4125	2403	1447	433	267	90	51	28 577		7.3
Percent	4.6	16.8	21.2	25.4	14.4	8.4	5.1	1.5	0.9	0.3	0.2		100.0	
250-foot (76.20-meter) tower level														
N	101	334	465	572	241	94	63	16	2	3	6	1 897	6.7	6.8
NNE	82	251	301	349	197	164	189	40	18	10	11	1 612	5.7	8.1
NE	111	305	337	454	295	145	91	45	21	8	3	1 815	6.4	7.5
ENE	93	264	332	304	142	94	45	13	14	7	9	1 317	4.6	6.9
E	126	396	336	175	72	42	24	19	15	6	6	1 217	4.3	5.8
ESE	140	307	156	65	33	24	22	17	8	8	2	782	2.7	5.3
SE	137	356	179	127	58	33	34	10	6	1		941	3.3	5.4
SSE	94	286	315	280	136	82	55	31	32	14	6	1 331	4.7	7.1
S	111	337	503	778	604	343	249	90	51	20	18	3 104	10.9	8.4
SSW	70	255	378	649	565	381	192	53	20	10	1	2 574	9.0	8.4
SW	91	286	371	635	353	185	107	35	11	3	5	2 082	7.3	7.6
WSW	100	301	329	367	148	97	61	20	12	1	1	1 437	5.0	6.8
W	126	402	493	451	178	89	49	12	7	1		1 808	6.3	6.4
WNW	76	272	319	477	304	187	137	41	21	8	2	1 844	6.5	7.9
NW	81	277	533	761	456	225	120	39	34	9	5	2 540	8.9	7.8
NNW	74	295	400	554	266	103	39	16	4	1		1 752	6.1	6.9
Calm												453	1.6	
Total	1613	4924	5747	6998	4048	2288	1477	497	276	110	75	28 506		7.2
Percent	5.7	17.3	20.2	24.5	14.2	8.0	5.2	1.7	1.0	0.4	0.3		100.0	

TABLE V.- STATISTICAL DISTRIBUTION PARAMETER SUMMARY BY TOWER LEVEL AND FOR MONTHLY AND ANNUAL PERIODS

[Based on 15-minute averages]

Nominal tower level		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual average
Foot	Meter													
Magnitude of vector mean wind, $\lvert\bar{V}_r\rvert$, m/sec														
50	15.24	1.42	1.56	0.97	1.23	0.71	1.38	1.67	1.17	0.93	1.16	1.40	2.21	0.66
100	30.48	1.72	1.73	.91	1.27	.59	1.80	2.05	1.49	.99	1.35	1.47	2.62	.83
150	45.72	1.86	1.68	1.37	1.68	.75	2.11	2.60	1.75	.95	1.09	1.43	2.39	.91
200	60.96	1.96	1.82	1.55	2.43	1.01	2.39	2.50	1.68	.65	1.22	1.69	2.86	1.16
250	76.20	2.34	1.96	1.56	2.13	.81	2.03	2.29	1.28	.98	1.46	1.69	2.96	1.13
Scalar mean wind, $\bar{V}$, m/sec														
50	15.24	5.10	5.29	5.82	5.84	5.08	4.71	4.53	4.64	5.41	5.00	5.26	5.02	5.21
100	30.48	6.53	6.34	6.77	6.53	6.01	5.60	5.21	5.13	6.15	5.89	6.27	6.04	6.12
150	45.72	7.33	7.11	7.61	7.26	6.73	6.22	6.21	5.88	6.21	6.02	6.90	6.73	6.74
200	60.96	7.91	7.49	8.43	8.22	7.23	6.84	6.31	5.73	6.82	6.90	7.65	7.44	7.31
250	76.20	7.89	7.54	8.11	8.00	6.78	6.34	6.33	5.72	6.91	6.83	7.91	7.49	7.24
Mean of zonal components, $\Sigma X/N$, m/sec														
50	15.24	1.36	1.23	0.93	0.74	-0.41	0.01	0.47	-0.04	-0.66	0.18	1.09	1.99	0.66
100	30.48	1.70	1.37	.90	.97	-.19	.09	.82	.03	-.68	.26	1.15	2.42	.83
150	45.72	1.86	1.52	1.36	1.15	-.23	.23	.87	.02	-.66	.23	1.01	2.18	.89
200	60.96	1.96	1.53	1.53	1.77	-.06	.55	1.11	.07	-.35	.41	1.32	2.65	1.13
250	76.20	2.33	1.80	1.54	1.04	-.17	.47	.87	-.07	-.44	.51	1.49	2.82	1.11
Mean of meridional components, $\Sigma Y/N$, m/sec														
50	15.24	-0.40	-0.95	-0.27	0.98	0.57	1.38	1.60	1.17	-0.65	-1.15	-0.87	-0.95	-0.06
100	30.48	-.28	-1.05	-.16	.82	.56	1.80	1.88	1.49	-.71	-1.32	-.93	-1.00	-.01
150	45.72	.04	-.72	.10	1.22	.71	2.09	2.45	1.75	-.68	-1.07	-1.01	-.97	.22
200	60.96	-.01	-.97	.20	1.66	1.01	2.32	2.24	1.68	-.54	-1.15	-1.05	-1.06	.26
250	76.20	.23	-.76	.22	1.86	.85	1.97	2.11	1.28	-.87	-1.37	-.79	-.89	.21
Direction of vector mean wind, θ, deg														
50	15.24	286	307	286	217	144	181	196	178	45	351	308	295	265
100	30.48	279	307	280	230	161	183	204	181	44	349	309	292	271
150	45.72	269	295	266	224	162	186	200	181	44	348	315	294	256
200	60.96	270	302	263	227	176	193	206	182	33	340	308	292	257
250	76.20	264	293	262	209	169	193	202	177	27	340	298	287	259
Standard deviation of zonal components, σ_X, m/sec														
50	15.24	3.53	4.03	4.22	4.18	3.61	3.25	2.92	3.20	3.59	3.72	4.07	3.41	3.76
100	30.48	4.51	4.61	4.87	4.51	4.20	3.94	3.30	3.44	4.06	4.20	4.58	3.91	4.31
150	45.72	5.05	5.28	5.25	4.91	4.74	4.23	3.87	3.98	4.19	4.42	5.07	4.36	4.75
200	60.96	5.22	5.54	5.64	5.42	5.07	4.67	3.90	3.90	4.50	5.07	5.54	4.80	5.08
250	76.20	5.01	5.55	5.44	5.42	4.69	4.12	4.01	3.91	4.25	4.83	5.61	4.89	5.00
Standard deviation of meridional components, σ_Y, m/sec														
50	15.24	4.53	4.18	4.90	4.71	4.20	3.94	3.61	3.76	4.74	4.13	4.38	4.11	4.41
100	30.48	5.44	5.04	5.78	5.45	4.95	4.52	4.21	4.19	5.29	4.85	5.18	4.90	5.15
150	45.72	6.18	5.58	6.42	6.14	5.45	5.01	4.95	4.71	5.44	4.83	5.66	5.49	5.68
200	60.96	6.73	5.83	7.11	6.72	5.72	5.44	5.07	4.65	5.95	5.52	6.24	6.06	6.13
250	76.20	6.84	5.97	7.14	6.63	5.69	5.41	5.12	4.85	6.20	5.67	6.48	6.09	6.21
Correlation coefficient of zonal and meridional components, r_{XY}														
50	15.24	0.141	0.009	0.021	-0.061	0.346	0.365	0.172	0.222	0.330	0.300	0.022	0.074	0.111
100	30.48	.191	.023	.121	-.001	.347	.350	.206	.253	.409	.347	-.042	.072	.144
150	45.72	.174	.084	.106	-.040	.390	.355	.201	.233	.435	.387	.050	.127	.164
200	60.96	.207	.092	.107	-.069	.357	.346	.212	.252	.407	.339	.046	.075	.155
250	76.20	.146	-.001	.034	-.114	.319	.300	.130	.112	.344	.297	-.048	-.005	.084

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY

[Based on 15-minute averages]

Hour, EST	Magnitude of vector mean wind $\lvert\bar{V}_r\rvert$, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	1.77	1.32	1.15	1.83	0.66	1.57	1.73	1.40	0.29	1.28	1.40	2.32
0200	1.66	1.37	1.33	1.37	.64	1.51	1.78	1.16	.81	1.38	1.48	2.28
0300	1.69	1.49	1.31	1.28	.40	1.18	1.66	.73	.90	1.45	1.56	2.39
0400	1.46	1.70	1.30	1.15	.50	.87	1.48	.69	1.15	1.75	1.68	2.29
0500	1.22	1.53	1.29	1.04	.41	.61	1.13	.61	1.60	1.69	1.59	2.39
0600	1.19	1.39	1.14	.69	.61	.41	.75	.57	1.69	1.84	1.47	2.20
0700	1.22	1.49	1.14	.62	.87	.19	.56	.45	1.81	1.88	1.66	2.33
0800	1.42	1.59	1.61	.88	1.21	.31	.57	.47	1.90	2.07	1.85	2.34
0900	1.47	1.87	1.68	.71	1.22	.37	.74	.17	2.05	2.52	2.27	2.65
1000	1.52	2.09	1.23	.78	1.12	.97	1.06	.72	1.89	2.17	2.39	2.63
1100	1.37	2.04	1.33	.88	1.00	1.46	1.44	1.28	1.80	1.74	1.84	2.57
1200	1.61	2.08	1.34	.94	1.34	1.71	1.92	1.52	1.72	1.52	1.65	2.71
1300	1.76	1.84	1.21	1.03	1.57	2.32	2.04	2.02	1.67	.95	1.57	2.68
1400	1.55	2.24	1.34	1.26	1.66	2.32	2.34	2.26	1.43	.90	1.61	2.50
1500	1.52	2.26	1.17	1.50	1.68	2.39	2.32	2.29	1.21	.99	1.61	2.36
1600	1.51	1.79	1.17	1.48	1.87	1.96	2.61	2.08	1.15	.83	1.25	2.23
1700	1.34	1.32	.95	1.59	1.78	1.92	2.59	2.16	1.06	.75	.81	1.87
1800	1.27	1.08	.70	1.73	1.73	1.81	2.42	2.22	.97	.49	.67	1.80
1900	1.17	1.10	.68	1.84	1.65	2.10	2.40	2.05	.93	.33	.77	1.74
2000	1.25	1.19	.79	2.08	1.72	1.90	2.34	2.11	.79	.38	.87	1.90
2100	1.38	1.30	.87	2.13	1.71	1.95	2.24	2.33	.57	.54	.97	1.90
2200	1.49	1.28	.86	2.11	1.42	1.87	2.38	1.89	.49	.68	1.17	1.73
2300	1.60	1.48	.72	1.94	1.31	1.97	1.96	1.74	.08	.98	1.14	1.94
2400	1.71	1.39	.96	1.88	.91	1.74	1.89	1.55	.24	1.18	1.22	2.14
	250-foot (76.20-meter) tower level											
0100	2.72	1.72	1.94	3.34	1.19	2.84	3.14	1.77	0.55	1.34	1.74	3.38
0200	2.74	1.99	1.98	2.79	1.11	2.76	3.16	1.63	.94	1.62	1.78	3.18
0300	2.59	2.12	2.12	2.31	1.00	2.17	2.92	1.07	1.34	1.97	2.08	3.36
0400	2.42	2.35	2.13	2.10	1.36	2.01	2.55	1.09	1.75	2.45	2.28	3.23
0500	2.21	2.14	1.82	1.82	1.05	1.74	1.99	.96	2.12	2.43	2.30	3.08
0600	2.29	1.86	1.68	1.22	1.00	1.43	1.52	.96	2.06	2.59	2.16	2.97
0700	2.32	2.08	1.60	1.16	1.04	.78	1.32	.72	2.30	2.74	2.26	3.09
0800	2.13	2.03	1.70	1.04	1.08	.64	1.03	.74	2.25	2.57	2.38	2.84
0900	2.18	2.12	1.90	.74	1.06	.44	.86	.22	2.44	2.90	2.54	3.30
1000	2.13	2.28	1.38	1.12	.98	.76	.86	.43	2.33	2.61	2.56	3.42
1100	2.05	2.32	1.77	1.29	.85	1.29	.39	1.12	1.92	2.04	2.13	3.27
1200	2.46	2.48	2.01	1.53	1.25	1.87	2.16	1.55	1.83	1.65	1.83	3.37
1300	2.63	2.50	1.91	1.91	1.55	2.58	2.54	2.08	1.70	1.24	1.87	3.37
1400	2.45	2.94	2.23	2.23	1.90	3.02	2.72	2.50	1.30	1.17	1.89	3.25
1500	2.49	2.64	1.72	2.45	2.13	3.15	2.92	2.75	1.25	1.23	1.70	2.98
1600	2.35	2.12	1.86	2.62	2.46	2.83	3.28	2.46	1.21	.92	1.43	2.78
1700	2.36	1.71	1.61	2.72	2.54	2.90	3.44	2.39	.99	.75	1.03	2.56
1800	2.18	1.37	1.45	3.04	2.54	2.84	3.42	2.38	.97	.69	.81	2.61
1900	2.10	1.38	1.53	3.17	2.53	2.81	3.29	2.50	.80	.42	.87	2.51
2000	2.24	1.32	1.74	3.39	2.55	2.96	3.45	2.58	.62	.47	.92	2.56
2100	2.28	1.26	1.87	3.43	2.45	3.07	3.48	2.70	.54	.48	1.08	2.63
2200	2.51	1.48	1.82	3.29	2.21	3.04	3.75	2.18	.50	.74	1.26	2.60
2300	2.66	1.76	1.49	3.16	2.15	3.34	3.03	2.33	.21	1.05	1.39	2.70
2400	2.70	1.75	1.60	3.26	1.61	3.15	3.16	2.21	.43	1.32	1.46	3.04

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Scalar mean wind $\bar{V}$, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	5.04	4.78	5.26	5.41	4.63	3.76	3.67	4.02	4.79	4.83	5.01	4.67
0200	4.67	5.03	5.54	5.18	4.40	4.20	3.69	3.80	4.67	4.71	5.03	4.64
0300	5.01	4.65	5.53	5.16	4.38	3.83	3.60	3.74	4.91	4.49	4.82	4.68
0400	4.93	4.82	5.46	5.31	4.44	3.89	3.68	3.61	4.84	4.63	4.79	4.67
0500	4.89	4.82	5.60	5.01	4.39	3.88	3.73	3.56	5.00	4.53	4.92	4.51
0600	4.92	4.67	5.43	5.01	4.43	4.08	3.44	3.62	4.78	4.60	4.82	4.49
0700	4.93	4.75	5.51	5.29	4.92	4.64	3.78	3.90	5.01	4.43	5.04	4.56
0800	4.89	5.03	6.14	5.72	5.20	4.78	4.31	4.45	5.56	4.89	5.13	4.78
0900	5.31	5.45	6.45	6.24	5.47	4.89	4.45	4.78	5.81	5.64	5.89	5.33
1000	5.56	5.67	6.52	6.46	5.73	4.92	4.67	4.81	5.89	5.56	6.20	5.78
1100	5.78	5.80	6.39	6.41	5.73	5.22	4.89	5.13	6.04	5.45	6.44	5.78
1200	5.79	6.11	6.44	6.42	6.01	5.56	5.20	5.23	6.10	5.45	6.13	5.89
1300	5.67	6.32	6.67	6.78	6.23	5.78	5.41	5.45	6.30	5.78	6.31	6.04
1400	5.59	6.34	6.56	6.67	6.03	5.78	5.67	5.56	6.42	5.89	6.43	5.89
1500	5.42	6.32	6.43	6.56	5.78	5.67	5.67	5.56	6.23	5.78	6.13	5.67
1600	5.20	5.67	6.21	6.22	5.67	5.45	5.56	5.33	6.14	5.45	5.56	5.31
1700	4.78	5.24	6.03	6.22	5.45	5.20	5.39	5.21	5.78	5.22	5.14	4.78
1800	4.78	4.77	5.39	6.01	5.33	5.02	5.04	4.89	5.45	4.89	4.78	4.56
1900	4.89	4.89	5.43	5.45	5.20	4.89	4.56	4.45	5.30	4.78	4.78	4.56
2000	4.67	4.78	5.42	5.45	4.89	4.56	4.42	4.46	5.33	4.69	4.89	4.67
2100	5.04	4.89	5.33	5.43	4.78	4.41	4.34	4.67	5.21	4.89	5.00	4.78
2200	5.03	5.10	5.42	5.45	4.56	4.32	4.30	4.42	4.67	5.02	4.67	5.10
2300	5.02	5.03	5.34	5.67	4.67	4.24	4.01	4.41	4.89	4.78	5.14	4.89
2400	5.10	5.02	5.20	5.45	4.56	4.03	3.78	4.33	5.03	4.78	5.32	4.78
	250-foot (76.20-meter) tower level											
0100	8.21	7.67	7.89	8.44	6.78	6.13	6.22	5.78	6.67	7.13	7.78	7.67
0200	8.03	7.56	8.23	8.02	6.56	6.22	6.31	5.45	6.56	7.15	7.89	7.44
0300	8.13	7.40	8.22	7.89	6.67	5.78	6.21	5.46	6.78	7.21	7.88	7.43
0400	8.14	7.45	8.24	8.04	6.45	6.03	6.12	5.34	6.89	7.23	7.89	7.42
0500	8.01	7.45	8.20	7.78	6.43	6.24	6.03	5.32	7.01	7.04	8.03	7.11
0600	7.89	7.31	8.21	7.45	6.22	5.89	5.67	5.41	7.00	7.03	7.89	7.23
0700	7.67	7.33	8.10	7.03	6.12	5.67	5.44	5.22	6.67	7.02	7.88	7.14
0800	7.68	7.54	8.03	7.45	6.10	5.56	5.52	5.34	6.45	6.56	7.87	7.13
0900	8.03	7.45	8.12	7.67	6.21	5.45	5.33	5.34	6.56	6.45	7.89	7.34
1000	7.67	7.46	8.02	7.78	6.56	5.46	5.56	5.33	6.57	6.56	8.01	7.67
1100	7.67	7.53	8.13	7.89	6.43	5.78	5.78	5.56	6.67	6.43	8.00	7.45
1200	7.78	7.78	8.21	7.78	7.11	6.53	6.33	5.89	6.78	6.32	7.78	7.78
1300	7.89	7.89	8.24	8.42	7.44	6.89	6.56	6.31	7.13	6.56	8.01	7.79
1400	7.78	7.89	8.32	8.56	7.45	7.12	7.21	6.30	7.34	6.89	8.12	7.67
1500	7.42	7.67	8.49	8.57	7.42	7.11	7.20	6.56	7.13	6.78	8.13	7.56
1600	7.31	7.43	8.13	8.24	7.34	7.00	7.23	6.12	7.21	6.45	7.67	7.45
1700	7.30	7.12	8.01	8.13	7.20	6.78	7.01	6.03	7.03	6.46	7.43	7.22
1800	7.56	6.78	7.59	8.12	7.11	6.67	6.78	5.78	6.78	6.66	7.45	7.10
1900	8.13	7.11	7.89	8.10	7.23	6.56	6.32	5.67	6.79	6.78	7.67	7.32
2000	7.78	7.24	8.10	8.11	6.89	6.56	6.33	5.67	7.00	6.89	7.68	7.31
2100	8.04	7.25	8.20	8.23	6.88	6.43	6.45	6.12	6.78	6.88	8.04	7.67
2200	8.33	7.45	8.43	8.32	7.02	6.45	6.46	5.68	7.12	8.14	7.66	8.43
2300	8.42	7.46	8.22	8.44	7.10	6.44	6.31	5.78	6.89	7.12	8.32	7.88
2400	8.31	7.67	8.13	8.31	6.88	6.32	6.20	5.77	6.78	7.41	8.20	7.89

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Mean of zonal components ΣX/N, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	1.67	1.18	1.02	1.41	0.32	0.62	1.01	0.78	0.04	0.59	1.16	2.01
0200	1.51	1.19	1.09	1.13	.40	.83	1.16	.92	.03	.62	1.22	1.99
0300	1.42	1.18	1.07	1.03	.39	.81	1.23	.58	.21	.72	1.23	2.04
0400	1.16	1.20	1.04	.97	.31	.75	1.10	.63	.06	.84	1.33	1.92
0500	.96	.99	.70	.92	.08	.55	.99	.60	-.23	.56	1.24	1.81
0600	.98	.88	.69	.65	-.01	.37	.66	.56	-.31	.59	.99	1.65
0700	.91	.88	.78	.62	-.17	.19	.54	.37	-.26	.40	1.14	1.80
0800	1.15	1.09	1.06	.82	-.38	.19	.49	.05	-.66	.45	1.09	1.82
0900	1.28	1.19	.92	.70	-.70	-.11	.36	-.12	-.97	.31	1.34	2.04
1000	1.37	1.35	.78	.76	-1.05	-.40	.12	-.63	-1.03	-.24	1.12	2.16
1100	1.30	1.60	1.23	.80	-1.00	-.53	.09	-.93	-1.38	-.39	1.18	2.31
1200	1.61	1.81	1.34	.71	-1.19	-.59	.21	-.87	-1.48	-.45	1.15	2.50
1300	1.74	1.75	1.20	.61	-1.17	-.63	.19	-1.05	-1.53	-.34	1.35	2.50
1400	1.55	2.15	1.32	.67	-1.02	-.70	-.05	-.81	-1.37	-.35	1.38	2.41
1500	1.52	2.09	1.17	.50	-.93	-.61	-.02	-.52	-1.19	-.10	1.38	2.30
1600	1.51	1.64	1.13	.54	-1.06	-.30	-.08	-.25	-1.13	-.33	1.16	2.18
1700	1.34	1.15	.92	.52	-.83	-.31	.17	-.07	-1.06	-.37	.77	1.78
1800	1.26	1.00	.51	.38	-.74	-.22	.19	-.19	-.95	-.21	.66	1.74
1900	1.15	.83	.59	.24	-.69	-.06	.15	-.32	-.87	.03	.77	1.72
2000	1.25	.80	.65	.27	-.54	-.20	.36	-.53	-.74	.16	.84	1.75
2100	1.38	.75	.73	.39	-.29	-.03	.42	.04	-.54	.37	.87	1.76
2200	1.48	.85	.75	.83	-.12	.20	.57	.00	-.43	.40	.96	1.69
2300	1.57	1.05	.72	1.09	.16	.22	.64	.19	-.07	.68	.91	1.83
2400	1.65	.96	.95	1.32	.26	.53	.73	.52	.01	.64	.98	2.00
	250-foot (76.20-meter) tower level											
0100	2.72	1.66	1.94	2.30	0.74	1.32	2.07	1.00	0.45	0.99	1.62	3.10
0200	2.75	1.91	1.90	2.01	.93	1.67	2.36	1.21	.51	1.14	1.65	2.91
0300	2.53	1.90	2.03	1.70	1.00	1.66	2.43	.96	.60	1.39	1.77	3.01
0400	2.38	1.91	1.99	1.74	1.23	1.77	2.32	1.04	.59	1.55	1.99	2.85
0500	2.21	1.76	1.45	1.53	.78	1.63	1.87	.96	.11	1.27	1.97	2.58
0600	2.25	1.44	1.40	1.14	.77	1.39	1.44	.80	.12	1.03	1.67	2.49
0700	2.29	1.64	1.48	1.16	.42	.78	1.28	.53	.12	.97	1.70	2.65
0800	2.10	1.71	1.50	1.03	.08	.62	1.00	.38	-.30	.74	1.75	2.44
0900	2.17	1.83	1.58	.68	-.12	.18	.78	.04	-.79	.61	1.71	2.91
1000	2.13	1.90	1.34	.85	-.79	.02	.44	-.42	-.92	.10	1.67	3.14
1100	2.00	2.10	1.76	.84	-.80	-.16	.24	-.98	-1.16	-.15	1.59	3.18
1200	2.33	2.30	1.94	.66	-1.18	-.34	.24	-1.04	-1.25	-.14	1.57	3.27
1300	2.46	2.50	1.79	.60	-1.16	-.52	.14	-1.35	-1.40	.04	1.81	3.31
1400	2.26	2.91	2.06	.80	-1.01	-.58	.09	-1.22	-1.21	.10	1.83	3.21
1500	2.36	2.54	1.47	.32	-1.04	-.58	-.05	-1.05	-1.19	.16	1.64	2.97
1600	2.30	2.02	1.47	.53	-1.28	-.36	-.12	-.65	-1.17	-.06	1.41	2.77
1700	2.20	1.63	1.36	.36	-1.17	-.33	-.16	-.42	-.99	-.08	1.02	2.53
1800	2.10	1.37	.83	.41	-1.00	-.19	-.19	-.50	-.97	-.20	.81	2.58
1900	2.02	1.30	1.02	.14	-.78	-.21	.05	-.45	-.77	.09	.87	2.51
2000	2.24	1.23	1.06	.31	-.53	.06	.52	-.79	-.62	.22	.91	2.49
2100	2.21	1.11	1.35	.64	-.17	.33	.65	-.26	-.42	.26	1.04	2.57
2200	2.48	1.36	1.36	1.23	.09	.70	1.05	-.19	-.41	.43	1.17	2.58
2300	2.64	1.61	1.38	1.86	.47	1.03	1.10	.09	.05	.88	1.26	2.64
2400	2.70	1.55	1.58	2.19	.59	1.33	1.47	.58	.41	1.04	1.33	2.92

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Mean of meridional component ΣY/N, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	-0.59	-0.59	-0.54	1.16	0.58	1.44	1.40	1.16	-0.29	-1.14	-0.77	-1.16
0200	-.70	-.68	-.77	.78	.50	1.26	1.34	.70	-.81	-1.23	-.84	-1.12
0300	-.92	-.90	-.75	.77	-.09	.86	1.11	.44	-.88	-1.26	-.96	-1.25
0400	-.89	-1.20	-.77	.60	-.39	.44	.98	.27	-1.15	-1.54	-1.02	-1.24
0500	-.75	-1.17	-1.08	.48	-.40	.26	.54	-.13	-1.58	-1.59	-.99	-1.43
0600	-.68	-1.08	-.91	.23	-.61	.16	.34	-.14	-1.66	-1.74	-1.09	-1.45
0700	-.81	-1.20	-.83	-.08	-.86	.02	.15	-.24	-1.79	-1.83	-1.21	-1.47
0800	-.84	-1.16	-1.21	-.33	-1.15	.24	.28	-.46	-1.78	-2.02	-1.49	-1.46
0900	-.73	-1.44	-1.40	-.13	-.99	.35	.65	-.12	-1.80	-2.50	-1.83	-1.69
1000	-.65	-1.59	-.95	.15	-.39	.88	1.05	.34	-1.58	-2.15	-2.11	-1.51
1100	-.42	-1.25	-.49	.35	.06	1.36	1.44	.88	-1.15	-1.70	-1.41	-1.11
1200	-.08	-1.02	.04	.61	.61	1.60	1.91	1.24	-.88	-1.19	-1.18	-1.05
1300	-.22	-.55	.11	.83	1.05	2.23	2.03	1.73	-.67	-.89	-.79	-.97
1400	-.03	-.64	.21	1.06	1.31	2.21	2.34	2.11	-.40	-.83	-.83	-.67
1500	-.05	-.86	.07	1.41	1.39	2.31	2.32	2.23	-.19	-.99	-.83	-.53
1600	-.12	-.71	.31	1.38	1.54	1.94	2.61	2.06	-.20	-.76	-.47	-.45
1700	.04	-.63	.24	1.51	1.57	1.90	2.58	2.16	-.02	-.65	-.25	-.57
1800	-.14	-.43	.47	1.68	1.56	1.80	2.41	2.21	.21	.44	-.09	-.47
1900	-.19	-.71	.35	1.82	1.49	2.10	2.40	2.03	.34	-.32	-.08	-.18
2000	.01	-.87	.45	2.06	1.63	1.88	2.32	2.04	.25	-.34	-.21	-.75
2100	-.01	-1.06	.47	2.09	1.68	1.95	2.20	2.33	.18	-.39	-.42	-.76
2200	-.22	-.96	.42	1.94	1.41	1.85	2.31	1.89	.24	-.54	-.67	-.35
2300	-.28	-1.04	-.04	1.60	1.30	1.96	1.85	1.73	.01	-.70	-.69	-.64
2400	-.45	-1.00	-.12	1.34	.87	1.66	1.74	1.46	-.24	-.98	-.72	-.75
	250-foot (76.20-meter) tower level											
0100	-0.17	-0.45	-0.17	2.42	0.93	2.51	2.36	1.45	-0.31	-0.90	-0.64	-1.35
0200	-.13	-.57	-.54	1.94	.59	2.19	2.09	1.09	-.78	1.15	-.67	-1.28
0300	-.56	-.94	-.59	1.57	-.03	1.40	1.62	.47	-1.20	-1.39	-1.10	-1.50
0400	-.45	-1.32	-.75	1.17	-.57	.93	1.07	.30	-1.65	-1.90	-1.11	-1.51
0500	-.15	-1.21	-1.10	.98	-.70	.61	.65	-.02	-2.12	-2.07	-1.18	-1.68
0600	-.43	-1.19	-.94	.41	-.64	.31	.46	-.52	-2.06	-2.37	-1.37	-1.62
0700	-.35	-1.27	-.61	.01	-.95	.09	.32	-.49	-2.29	-2.56	-1.49	-1.59
0800	-.32	-1.09	-.81	.09	-1.08	.15	.22	-.63	-2.23	-2.46	-1.62	-1.45
0900	-.20	-1.06	-1.05	.30	-1.05	.39	.37	-.21	-2.37	-2.84	-1.87	-1.55
1000	.03	-1.25	-.35	.73	-.58	.76	.74	.10	-2.14	-2.61	-1.94	-1.33
1100	.44	-.98	.15	.97	-.28	1.28	1.37	.53	-1.52	-2.04	-1.41	-.78
1200	.57	-.89	.51	1.37	.41	1.83	2.15	1.14	-1.33	-1.51	-.95	-.83
1300	.93	-.13	.65	1.81	1.03	2.53	2.53	1.59	-.96	-1.24	-.46	-.64
1400	.93	-.42	.84	2.08	1.61	2.96	2.72	2.18	-.46	-1.16	-.48	-.48
1500	.81	-.71	.88	2.43	1.85	3.09	2.92	2.54	-.38	-1.22	-.42	-.27
1600	.51	-.64	1.14	2.57	2.10	2.81	3.28	2.38	-.31	-.92	-.23	-.12
1700	.85	-.51	.86	2.69	2.25	2.88	3.44	2.35	-.03	-.75	-.10	-.42
1800	.58	-.06	1.18	3.01	2.33	2.83	3.41	2.32	.10	-.66	.00	-.39
1900	.55	-.46	1.14	3.16	2.40	2.80	3.29	2.46	.21	-.41	.01	-.13
2000	.58	-.46	1.38	3.37	2.49	2.96	3.41	2.45	.07	-.42	-.13	-.58
2100	.54	-.59	1.28	3.37	2.44	3.05	3.42	2.68	.34	-.40	-.29	-.52
2200	.35	-.58	1.20	3.05	2.21	2.96	3.60	2.17	.28	-.60	-.45	-.31
2300	.36	-.70	.56	2.56	2.10	3.17	2.83	2.32	.21	-.57	-.59	-.55
2400	.18	-.82	.29	2.41	1.49	2.85	2.79	2.14	-.11	-.82	-.61	-.85

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Direction of vector mean wind θ, deg, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	289	296	298	231	209	203	216	214	351	333	303	300
0200	295	299	305	236	219	213	221	233	357	333	304	299
0300	303	307	305	233	283	224	228	233	346	330	308	301
0400	307	315	307	239	322	240	228	247	357	331	307	303
0500	308	320	327	243	349	245	242	283	8	340	308	308
0600	305	321	323	251	2	246	243	284	11	341	318	311
0700	311	324	317	278	11	263	255	303	8	348	316	309
0800	306	317	319	292	18	218	240	353	20	347	324	309
0900	300	321	327	280	35	162	209	44	28	353	324	309
1000	295	320	321	259	70	156	187	118	33	7	332	305
1100	288	308	292	246	93	159	184	133	50	13	320	296
1200	273	299	268	230	117	160	186	145	60	5	301	293
1300	277	287	265	217	132	164	185	149	66	21	300	291
1400	271	286	261	213	142	162	179	159	74	23	301	285
1500	272	292	267	200	146	165	179	167	81	6	301	283
1600	275	293	255	202	145	171	178	173	80	24	292	282
1700	269	299	255	199	152	171	184	178	89	30	288	288
1800	276	293	228	193	154	173	185	175	103	25	278	285
1900	279	311	239	188	155	178	184	171	111	355	276	276
2000	270	317	235	188	162	174	189	165	109	335	284	293
2100	270	325	237	191	170	179	191	181	109	316	296	291
2200	278	319	241	203	175	186	194	180	119	324	305	282
2300	280	315	273	214	187	187	199	186	103	316	307	289
2400	285	316	277	225	197	198	203	200	357	327	306	290
	250-foot (76.20-meter) tower level											
0100	274	285	275	224	218	208	221	215	304	312	291	293
0200	273	286	286	226	238	217	229	228	327	315	292	294
0300	282	296	286	227	272	230	236	244	334	315	302	296
0400	281	304	291	236	295	242	245	254	340	321	299	298
0500	274	304	307	238	312	250	251	271	357	328	301	303
0600	281	309	304	250	309	257	252	303	357	336	309	303
0700	279	308	292	269	336	263	256	313	357	339	311	301
0800	279	302	298	265	356	257	258	329	8	343	313	301
0900	275	300	303	246	7	205	245	347	18	348	318	298
1000	269	303	285	230	54	182	211	104	23	358	319	293
1100	258	295	265	221	71	173	190	119	37	4	311	284
1200	256	291	255	206	109	169	186	138	43	316	293	284
1300	249	273	250	198	131	168	187	140	56	358	291	281
1400	248	278	248	201	148	169	182	151	69	355	285	278
1500	251	285	239	188	151	169	179	158	72	352	284	275
1600	258	288	233	192	149	173	178	165	75	4	279	272
1700	249	287	238	188	152	173	177	170	88	7	276	279
1800	255	271	215	188	157	176	177	168	96	17	270	279
1900	255	290	222	183	162	176	181	170	106	348	269	273
2000	256	291	217	185	168	181	189	162	96	332	278	283
2100	256	298	227	191	176	186	191	174	129	327	285	281
2200	262	293	229	202	182	193	196	175	124	325	291	277
2300	262	293	248	216	193	198	201	182	194	303	295	282
2400	266	298	260	222	202	205	208	195	285	308	294	286

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Standard deviation of zonal components, σ_X, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	3.34	3.55	3.59	3.42	2.90	2.58	2.06	2.71	3.09	3.58	3.76	3.12
0200	3.15	3.74	4.08	3.43	3.00	3.21	1.81	2.42	3.12	3.53	3.75	3.08
0300	3.40	3.55	3.73	3.57	3.07	2.94	1.76	2.50	3.25	3.31	3.64	3.15
0400	3.53	3.69	3.60	3.68	3.05	2.89	2.27	2.34	3.37	3.18	3.33	3.21
0500	3.55	3.82	3.88	3.53	2.98	3.10	2.20	2.41	3.42	3.27	3.63	2.99
0600	3.65	3.76	3.96	3.56	3.03	3.31	2.24	2.40	3.36	3.08	3.47	2.72
0700	3.46	3.86	3.84	3.59	3.45	3.78	2.64	2.75	3.57	3.05	3.72	2.71
0800	3.36	3.93	4.03	4.02	3.73	4.05	3.09	3.07	3.95	3.53	4.00	3.05
0900	3.43	4.17	4.40	4.66	4.13	3.90	3.08	3.45	3.97	3.88	4.53	3.37
1000	3.67	4.47	4.55	5.17	4.33	3.64	3.12	3.36	3.99	4.00	4.86	3.68
1100	4.15	4.59	4.67	5.06	4.22	3.43	3.42	3.41	3.84	4.08	4.87	3.88
1200	3.93	4.64	4.93	5.18	4.45	3.64	3.69	3.52	4.01	4.21	4.69	3.98
1300	3.86	4.91	5.17	5.60	4.42	3.52	3.76	3.80	4.10	4.30	4.78	4.22
1400	3.75	4.90	5.17	5.24	4.43	3.58	3.90	3.77	4.18	4.52	4.69	4.19
1500	3.63	4.56	4.96	4.95	4.04	3.35	3.81	3.78	3.99	4.26	4.55	4.00
1600	3.46	4.13	4.72	4.49	4.05	3.37	3.51	3.76	3.74	4.00	4.07	3.50
1700	3.38	3.82	4.51	4.52	3.64	3.13	3.31	3.60	3.49	4.05	3.85	3.56
1800	3.49	3.59	4.07	3.93	3.43	2.87	3.14	3.35	3.39	3.56	3.68	3.25
1900	3.36	3.71	3.90	3.47	3.26	2.78	2.83	3.15	3.52	3.61	3.68	3.25
2000	3.12	3.73	4.01	3.67	3.21	3.01	2.66	3.04	3.15	3.44	3.81	3.39
2100	3.49	3.68	3.95	3.63	3.06	2.92	2.52	3.56	3.16	3.60	3.94	3.35
2200	3.47	3.71	3.71	3.50	3.00	2.95	2.59	3.03	3.28	3.35	3.97	3.29
2300	3.48	3.84	3.97	3.58	3.10	2.70	2.41	3.05	3.04	3.36	4.07	3.24
2400	3.66	3.66	3.54	3.58	3.03	2.57	2.32	2.81	3.17	3.60	4.19	3.19
	250-foot (76.20-meter) tower level											
0100	5.45	5.46	4.93	4.79	4.31	3.82	3.34	3.94	4.06	4.94	5.23	4.68
0200	5.27	5.47	5.50	4.79	4.53	4.47	3.26	3.65	4.01	4.93	5.48	4.58
0300	5.24	5.35	4.99	5.17	4.50	4.14	3.23	3.62	4.26	4.96	5.21	4.74
0400	5.28	5.53	4.75	5.27	4.36	4.11	3.58	3.41	4.33	4.83	4.98	4.82
0500	5.19	5.64	5.23	5.16	4.45	4.44	3.54	3.50	4.42	4.87	5.13	4.68
0600	5.17	5.54	5.51	4.97	4.16	4.39	3.65	3.26	4.58	4.56	5.12	4.47
0700	4.69	5.40	5.08	4.80	4.11	4.41	3.74	3.49	4.32	4.47	5.24	4.34
0800	4.66	5.53	5.21	5.34	4.29	4.57	4.03	3.58	4.35	4.51	5.53	4.34
0900	4.71	5.54	5.21	5.59	4.66	4.43	3.86	3.69	4.50	4.67	5.87	4.77
1000	4.82	5.79	5.48	5.98	5.08	4.04	3.99	3.75	4.34	4.81	6.13	5.18
1100	4.91	5.99	5.69	5.97	4.87	3.85	4.18	4.07	4.39	4.80	6.15	5.04
1200	4.90	5.87	6.14	6.17	5.36	4.13	4.44	4.05	4.41	4.94	5.95	5.27
1300	5.03	5.94	5.99	6.52	5.33	3.98	4.53	4.26	4.51	5.15	6.17	5.65
1400	4.87	6.05	6.19	6.44	5.33	4.04	4.88	4.25	4.63	5.24	6.08	5.50
1500	4.59	5.79	6.08	6.10	5.09	3.83	4.77	4.34	4.41	5.02	6.05	5.38
1600	4.69	5.46	5.85	5.59	4.86	3.87	4.46	4.15	4.21	4.80	5.71	5.10
1700	4.68	5.20	5.83	5.51	4.37	3.66	4.17	4.18	4.00	4.95	5.47	5.28
1800	4.96	4.98	5.37	5.20	4.34	3.63	3.86	3.98	3.83	4.85	5.39	4.62
1900	5.13	5.34	5.37	5.01	4.32	3.54	3.66	3.72	4.08	4.80	5.53	4.66
2000	4.96	5.36	5.30	5.10	4.39	3.90	3.77	3.64	3.89	4.65	5.39	4.51
2100	5.32	5.49	5.38	5.09	4.47	4.00	3.76	4.00	3.61	4.68	5.57	7.74
2200	5.29	5.39	5.17	4.92	4.43	4.19	3.68	3.78	3.94	4.75	5.68	4.74
2300	5.54	5.53	5.35	5.00	4.72	4.00	3.84	3.93	3.92	4.57	5.85	5.06
2400	5.32	5.47	4.89	4.81	4.62	3.75	3.66	3.77	3.98	4.90	5.86	5.10

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Continued

[Based on 15-minute averages]

Hour, EST	Standard deviation of meridional components σ_y, m/sec, for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	4.25	4.04	4.97	4.60	4.03	3.26	3.07	3.37	4.29	3.87	4.18	3.77
0200	4.15	4.01	4.91	4.53	3.86	3.23	3.23	3.54	4.23	3.68	4.05	3.73
0300	4.33	3.79	4.95	4.48	3.92	3.17	3.23	3.43	4.22	3.51	4.00	3.73
0400	4.24	3.72	4.93	4.47	3.77	3.48	3.18	3.38	4.09	3.51	4.01	3.78
0500	4.28	3.62	4.95	4.19	3.91	3.55	3.27	3.25	4.11	3.50	4.08	3.66
0600	4.21	3.67	4.67	4.33	3.84	3.58	3.19	3.33	3.93	3.65	4.05	3.83
0700	4.20	3.76	4.92	4.61	4.13	4.02	3.43	3.57	4.15	3.53	4.11	3.85
0800	4.37	4.06	5.12	4.81	4.14	3.96	3.69	4.09	4.56	3.83	4.02	3.99
0900	4.97	4.41	5.27	4.91	4.05	4.01	3.80	4.17	4.51	4.04	4.38	4.31
1000	4.93	4.30	5.28	4.79	4.27	3.92	3.83	4.07	4.77	4.25	4.55	4.73
1100	4.96	4.14	5.02	4.65	4.37	4.29	3.79	4.10	5.05	4.23	4.88	4.71
1200	5.03	4.67	4.83	4.53	4.42	4.50	3.73	4.15	5.16	4.21	4.73	4.63
1300	4.99	4.73	4.94	4.76	4.60	4.59	3.85	3.89	5.37	4.54	4.93	4.55
1400	5.04	4.57	4.79	4.86	4.24	4.52	3.96	3.93	5.28	4.59	5.11	4.41
1500	4.75	4.88	4.74	4.96	4.31	4.48	4.01	3.92	5.35	4.70	4.68	4.40
1600	4.62	4.62	4.73	4.96	4.24	4.45	4.04	3.70	5.35	4.39	4.56	4.26
1700	4.30	4.30	4.69	4.88	4.35	4.32	3.95	3.57	5.19	4.40	4.43	3.82
1800	4.34	4.05	4.50	4.86	4.20	4.27	3.81	3.43	4.91	4.38	4.32	3.88
1900	4.60	4.27	4.90	4.80	4.34	4.15	3.48	3.13	4.61	4.21	4.33	3.97
2000	4.42	4.07	4.74	4.62	3.96	3.69	3.34	3.35	4.88	4.32	4.38	3.82
2100	4.38	4.11	4.76	4.58	3.92	3.38	3.39	3.58	4.79	4.25	4.27	4.02
2200	4.50	4.31	5.00	4.61	3.95	3.23	3.09	3.45	4.56	4.16	4.08	3.97
2300	4.46	3.90	4.72	4.82	3.90	3.31	3.21	3.48	4.49	4.28	4.24	4.20
2400	4.32	4.08	4.82	4.56	3.99	3.36	3.10	3.55	4.58	3.96	4.33	4.04
	250-foot (76.20-meter) tower level											
0100	6.74	6.15	7.25	6.99	6.01	5.04	4.99	4.81	6.14	6.00	6.62	6.06
0200	6.49	6.13	7.34	6.81	5.63	4.71	5.09	4.93	5.97	5.92	6.62	5.94
0300	6.79	5.78	7.48	6.72	5.74	4.71	5.17	5.04	5.92	5.77	6.54	5.75
0400	6.74	5.54	7.34	6.68	5.39	5.09	5.03	4.77	5.84	5.51	6.52	5.76
0500	6.99	5.69	7.15	6.60	5.28	5.33	5.18	4.68	5.86	5.34	6.59	5.67
0600	6.77	5.71	6.94	6.39	5.23	5.09	5.05	4.95	5.61	5.38	6.61	5.91
0700	6.75	5.83	7.19	6.14	5.26	5.10	4.52	4.81	5.52	5.41	6.49	5.81
0800	6.82	6.10	6.97	6.40	5.12	4.85	4.61	4.82	5.61	5.11	6.20	5.88
0900	7.22	6.13	7.01	6.45	5.00	4.80	4.46	4.81	5.49	4.76	6.03	6.02
1000	6.94	5.91	6.96	6.14	5.03	4.87	4.54	4.80	5.57	4.99	6.05	6.26
1100	7.04	5.57	6.73	6.02	5.10	5.29	4.60	4.71	5.85	4.93	6.21	6.26
1200	6.99	6.24	6.63	5.74	5.40	5.42	4.74	4.81	6.16	4.99	6.15	6.22
1300	7.20	6.37	6.74	6.11	5.56	5.90	4.96	4.79	6.40	5.25	6.17	5.90
1400	7.23	5.96	6.47	6.45	5.60	5.91	5.36	4.71	6.50	5.51	6.37	5.88
1500	6.67	6.06	6.89	6.75	5.78	5.95	5.39	4.87	6.48	5.69	6.12	6.03
1600	6.49	5.92	6.80	6.58	5.62	5.85	5.55	4.53	6.63	5.43	6.18	6.12
1700	6.45	5.93	6.97	6.55	6.00	5.98	5.47	4.43	6.62	5.60	6.35	5.75
1800	6.72	5.92	6.91	6.66	5.97	5.93	5.50	4.40	6.54	5.87	6.51	6.09
1900	7.06	6.13	7.41	6.96	6.14	5.75	5.08	4.44	6.42	6.06	6.74	6.37
2000	6.65	6.14	7.44	6.79	5.75	5.37	4.86	4.61	6.68	6.18	6.74	6.40
2100	6.68	5.95	7.44	6.87	5.70	5.09	4.98	5.02	6.60	6.12	6.85	6.53
2200	7.12	6.27	7.77	6.99	5.89	5.10	4.90	4.59	6.47	6.26	6.84	6.58
2300	6.96	6.05	7.32	7.08	5.75	4.99	5.20	4.60	6.44	6.45	6.95	6.49
2400	6.90	6.11	7.49	7.00	5.61	5.27	4.97	4.76	6.23	6.33	6.82	6.36

TABLE VI.- STATISTICAL DISTRIBUTION PARAMETERS BY HOUR OF DAY – Concluded

[Based on 15-minute averages]

Hour, EST	Correlation coefficient of zonal and meridional components γ_{xy} for month of –											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	50-foot (15.24-meter) tower level											
0100	0.224	-0.007	0.076	-0.102	-0.391	0.603	0.206	0.262	0.409	0.388	0.031	0.086
0200	.220	-.015	.116	.006	.410	.578	.235	.219	.370	.380	.065	.119
0300	.173	.057	.005	-.018	.343	.521	.167	.328	.269	.352	.121	.116
0400	.220	.034	.039	.046	.226	.506	.269	.301	.316	.325	.139	.098
0500	.221	-.003	-.025	.083	.342	.549	.241	.334	.351	.308	.175	.100
0600	.250	-.001	-.054	.097	.390	.516	.332	.255	.357	.320	.195	.103
0700	.126	-.034	-.084	.091	.361	.474	.233	.306	.297	.378	.208	.097
0800	.062	-.089	-.011	-.059	.325	.368	.228	.293	.237	.370	.157	.073
0900	.078	-.044	.040	.031	.249	.283	.153	.250	.251	.381	.113	.054
1000	.089	-.077	.038	.091	.215	.207	.176	.106	.219	.341	.013	.102
1100	.028	.011	-.011	.041	.212	.171	.190	.149	.311	.293	-.050	.045
1200	.036	-.039	.018	-.111	.283	.142	.146	.114	.298	.290	-.088	.030
1300	.029	.007	-.034	-.056	.300	.251	.044	.106	.363	.239	-.076	-.021
1400	.075	.000	-.059	-.130	.287	.224	.020	.229	.315	.213	-.073	-.030
1500	.010	-.014	-.086	-.138	.326	.306	.000	.184	.339	.246	-.027	-.025
1600	.128	-.017	-.059	-.147	.367	.267	.070	.177	.327	.240	.011	.056
1700	.150	-.018	-.076	-.215	.434	.347	.217	.196	.382	.272	.061	.118
1800	.179	-.074	.024	-.146	.525	.422	.318	.370	.461	.326	.047	.139
1900	.211	.070	.142	-.098	.586	.576	.342	.398	.469	.257	-.060	.134
2000	.209	.108	.103	-.034	.572	.567	.313	.389	.389	.249	-.036	.161
2100	.269	.136	.201	-.117	.548	.633	.390	.389	.431	.274	-.022	.109
2200	.172	.087	.109	-.164	.533	.516	.371	.322	.382	.344	-.019	.166
2300	.205	.035	.108	-.152	.576	.561	.270	.378	.338	.401	-.012	.105
2400	.162	.018	.097	-.133	.402	.546	.269	.347	.387	.409	.000	.055
	250-foot (76.20-meter) tower level											
0100	0.223	0.087	0.130	-0.141	0.314	0.483	0.204	0.117	0.458	0.389	-0.015	0.119
0200	.180	.001	.141	-.072	.304	.461	.196	.066	.394	.402	-.012	.107
0300	.152	.019	.068	-.029	.335	.416	.200	.159	.336	.373	.029	.070
0400	.124	.034	.075	-.021	.334	.406	.299	.134	.323	.362	.083	.067
0500	.144	-.026	.018	.039	.357	.429	.270	.171	.335	.340	.128	.011
0600	.185	-.038	.013	.047	.358	.466	.278	.073	.356	.348	.128	-.020
0700	.120	-.102	-.066	.048	.359	.453	.302	.120	.315	.385	.102	.022
0800	.123	-.079	.006	-.004	.380	.404	.244	.142	.285	.373	.148	.054
0900	.037	-.028	.060	-.035	.356	.335	.215	.186	.255	.329	.083	-.093
1000	.019	-.099	.033	.014	.258	.204	.200	.047	.235	.297	-.060	-.043
1100	.025	-.062	.039	.018	.262	.194	.248	.054	.316	.292	-.089	-.063
1200	.006	-.054	.084	-.127	.290	.146	.167	.045	.320	.290	-.116	-.038
1300	.048	-.002	.018	-.129	.325	.250	.053	.128	.317	.295	-.129	-.096
1400	.074	.026	-.045	-.158	.309	.243	.014	.162	.322	.242	-.116	-.135
1500	.151	-.057	-.108	-.197	.362	.196	-.028	.118	.309	.216	-.078	-.125
1600	.185	-.040	-.107	-.253	.341	.151	.022	.143	.312	.233	-.095	-.085
1700	.196	.011	-.071	-.256	.329	.196	.130	.127	.380	.232	-.073	-.059
1800	.233	.044	-.029	-.284	.455	.254	.136	.198	.442	.246	-.104	-.064
1900	.273	.027	.064	-.171	.461	.354	.172	.231	.484	.250	-.210	-.029
2000	.219	.075	.101	-.176	.483	.408	.105	.235	.397	.237	-.157	.036
2100	.246	.103	.152	-.202	.364	.474	.157	.293	.462	.274	-.107	.030
2200	.184	.034	.103	-.215	.394	.327	.228	.183	.420	.274	-.122	.070
2300	.207	.053	.121	-.196	.453	.380	.116	.203	.402	.356	-.094	.091
2400	.159	.065	.127	-.144	.302	.382	.146	.112	.433	.374	-.094	.129

TABLE VII.- INTERLEVEL CORRELATION COEFFICIENTS

[Based on 15-minute averages]

Component	Mean	Standard deviation	N	Tower level	Matrix 50	100	150	200	250
				January					
Zonal	1.37	3.54	2839	50	1.000	-----	-----	-----	-----
	1.71	4.51	2853	100	.932	1.000	-----	-----	-----
	1.86	5.06	2884	150	.526	.531	1.000	-----	-----
	1.96	5.23	2878	200	.808	.863	.666	1.000	-----
	2.34	5.02	2746	250	.863	.902	.764	.862	1.000
Meridional	-0.39	4.54	2839	50	1.000	-----	-----	-----	-----
	-.28	5.45	2853	100	.959	1.000	-----	-----	-----
	.03	6.19	2884	150	.803	.776	1.000	-----	-----
	-.01	6.74	2878	200	.892	.910	.799	1.000	-----
	.23	6.85	2746	250	.947	.950	.854	.917	1.000
				February					
Zonal	1.24	4.04	2595	50	1.000	-----	-----	-----	-----
	1.37	4.61	2593	100	.945	1.000	-----	-----	-----
	1.53	5.30	2572	150	.967	.954	1.000	-----	-----
	1.53	5.55	2581	200	.874	.860	.888	1.000	-----
	1.81	5.55	2529	250	.944	.951	.977	.900	1.000
Meridional	-0.95	4.19	2595	50	1.000	-----	-----	-----	-----
	-1.05	5.05	2593	100	.960	1.000	-----	-----	-----
	-.73	5.60	2572	150	.966	.957	1.000	-----	-----
	-.98	5.84	2581	200	.819	.825	.828	1.000	-----
	-.77	5.98	2529	250	.946	.956	.970	.827	1.000
				March					
Zonal	0.94	4.23	2765	50	1.000	-----	-----	-----	-----
	.90	4.89	2682	100	.937	1.000	-----	-----	-----
	1.37	5.26	2644	150	.949	.959	1.000	-----	-----
	1.54	5.65	2624	200	.944	.955	.969	1.000	-----
	1.55	5.45	2745	250	.953	.926	.948	.963	1.000
Meridional	-0.27	4.93	2765	50	1.000	-----	-----	-----	-----
	-.17	5.79	2682	100	.956	1.000	-----	-----	-----
	.10	6.43	2644	150	.969	.973	1.000	-----	-----
	0.19	7.12	2624	200	.943	.956	.968	1.000	-----
	0.22	7.15	2745	250	.959	.956	.976	.970	1.000
				April					
Zonal	0.75	4.19	2071	50	1.000	-----	-----	-----	-----
	.97	4.53	2072	100	.927	1.000	-----	-----	-----
	1.15	4.93	2034	150	.931	.947	1.000	-----	-----
	1.77	5.44	2059	200	.895	.888	.938	1.000	-----
	1.03	5.42	2083	250	.943	.909	.906	.909	1.000
Meridional	0.98	4.72	2071	50	1.000	-----	-----	-----	-----
	.82	5.48	2072	100	.952	1.000	-----	-----	-----
	1.22	6.16	2034	150	.950	.965	1.000	-----	-----
	1.65	6.73	2059	200	.928	.927	.964	1.000	-----
	1.86	6.65	2083	250	.950	.947	.959	.956	1.000

TABLE VII.- INTERLEVEL CORRELATION COEFFICIENTS – Continued

[Based on 15-minute averages]

Component	Mean	Standard deviation	N	Matrix				
				Tower level	50	100	150	200	250
				May					
Zonal	-0.42	3.62	2154	50	1.000	-----	-----	-----	-----
	-.19	4.22	2157	100	.938	1.000	-----	-----	-----
	-.24	4.76	2094	150	.949	.944	1.000	-----	-----
	-.06	5.08	2094	200	.953	.951	.974	1.000	-----
	-.17	4.70	2149	250	.937	.923	.954	.963	1.000
Meridional	0.58	4.22	2154	50	1.000	-----	-----	-----	-----
	.57	4.97	2157	100	.913	1.000	-----	-----	-----
	.71	5.47	2094	150	.942	.958	1.000	-----	-----
	1.00	5.74	2094	200	.936	.949	.973	1.000	-----
	.85	5.71	2149	250	.931	.943	.968	.979	1.000
				June					
Zonal	0.01	3.26	1913	50	1.000	-----	-----	-----	-----
	.10	3.96	2073	100	.925	1.000	-----	-----	-----
	.24	4.27	2028	150	.940	.949	1.000	-----	-----
	.56	4.68	2141	200	.940	.951	.956	1.000	-----
	.47	4.13	2096	250	.903	.917	.929	.955	1.000
Meridional	1.40	3.97	1913	50	1.000	-----	-----	-----	-----
	1.81	4.54	2073	100	.934	1.000	-----	-----	-----
	2.11	5.04	2028	150	.947	.969	1.000	-----	-----
	2.34	5.45	2141	200	.949	.961	.971	1.000	-----
	1.99	5.43	2096	250	.938	.948	.963	.975	1.000
				July					
Zonal	0.48	2.94	2211	50	1.000	-----	-----	-----	-----
	.83	3.32	2174	100	.945	1.000	-----	-----	-----
	.88	3.88	2138	150	.926	.959	1.000	-----	-----
	1.13	3.90	2175	200	.916	.937	.967	1.000	-----
	.88	4.02	2003	250	.895	.917	.954	.913	1.000
Meridional	1.61	3.63	2211	50	1.000	-----	-----	-----	-----
	1.89	4.24	2174	100	.959	1.000	-----	-----	-----
	2.46	4.96	2138	150	.944	.974	1.000	-----	-----
	2.26	5.06	2175	200	.919	.939	.973	1.000	-----
	2.12	5.12	2003	250	.933	.951	.969	.934	1.000
				August					
Zonal	-0.04	3.21	2165	50	1.000	-----	-----	-----	-----
	.03	3.46	2169	100	.949	1.000	-----	-----	-----
	.02	4.00	2191	150	.923	.944	1.000	-----	-----
	.07	3.91	2198	200	.943	.965	.947	1.000	-----
	-.06	3.93	2043	250	.915	.914	.945	.938	1.000
Meridional	1.18	3.77	2165	50	1.000	-----	-----	-----	-----
	1.49	4.21	2169	100	.962	1.000	-----	-----	-----
	1.77	4.74	2191	150	.941	.971	1.000	-----	-----
	1.69	4.66	2198	200	.951	.975	.967	1.000	-----
	1.29	4.87	2043	250	.936	.955	.969	.970	1.000

TABLE VII.- INTERLEVEL CORRELATION COEFFICIENTS – Concluded

[Based on 15-minute averages]

Component	Mean	Standard deviation	N	Matrix					
				Tower level	50	100	150	200	250
				September					
Zonal	-0.66	3.61	2096	50	1.000	-----	-----	-----	-----
	-.68	4.07	2077	100	.950	1.000	-----	-----	-----
	-.65	4.20	2020	150	.931	.964	1.000	-----	-----
	-.34	4.51	1930	200	.939	.976	.959	1.000	-----
	-.44	4.27	2104	250	.945	.954	.949	.967	1.000
Meridional	-0.65	4.76	2096	50	1.000	-----	-----	-----	-----
	-.71	5.30	2077	100	.972	1.000	-----	-----	-----
	-.67	5.45	2020	150	.965	.982	1.000	-----	-----
	-.54	5.96	1930	200	.963	.982	.979	1.000	-----
	-.87	6.22	2104	250	.968	.979	.982	.985	1.000
				October					
Zonal	0.17	3.74	2462	50	1.000	-----	-----	-----	-----
	.28	4.22	2428	100	.959	1.000	-----	-----	-----
	.23	4.43	2302	150	.946	.976	1.000	-----	-----
	.40	5.07	2360	200	.953	.973	.980	1.000	-----
	.51	4.84	2480	250	.949	.954	.955	.979	1.000
Meridional	-1.16	4.14	2462	50	1.000	-----	-----	-----	-----
	-1.33	4.88	2428	100	.961	1.000	-----	-----	-----
	-1.07	4.85	2302	150	.952	.981	1.000	-----	-----
	-1.16	5.53	2360	200	.954	.973	.982	1.000	-----
	-1.38	5.69	2480	250	.954	.963	.972	.985	1.000
				November					
Zonal	1.10	4.09	2849	50	1.000	-----	-----	-----	-----
	1.15	4.59	2762	100	.962	1.000	-----	-----	-----
	1.01	5.08	2828	150	.952	.959	1.000	-----	-----
	1.33	5.54	2735	200	.958	.961	.984	1.000	-----
	1.49	5.62	2865	250	.950	.958	.960	.972	1.000
Meridional	-0.87	4.40	2849	50	1.000	-----	-----	-----	-----
	-.93	5.21	2762	100	.966	1.000	-----	-----	-----
	-1.02	5.68	2828	150	.954	.972	1.000	-----	-----
	-1.05	6.24	2735	200	.960	.976	.984	1.000	-----
	-.80	6.48	2865	250	.946	.965	.974	.982	1.000
				December					
Zonal	1.99	3.42	2896	50	1.000	-----	-----	-----	-----
	2.42	3.91	2963	100	.952	1.000	-----	-----	-----
	2.20	4.37	2813	150	.947	.938	1.000	-----	-----
	2.66	4.80	2802	200	.937	.930	.977	1.000	-----
	2.83	4.89	2663	250	.918	.930	.937	.960	1.000
Meridional	-0.96	4.13	2896	50	1.000	-----	-----	-----	-----
	-1.00	4.92	2963	100	.962	1.000	-----	-----	-----
	-.97	5.50	2813	150	.961	.958	1.000	-----	-----
	-1.07	6.06	2802	200	.949	.947	.984	1.000	-----
	-.90	6.10	2663	250	.940	.955	.972	.978	1.000

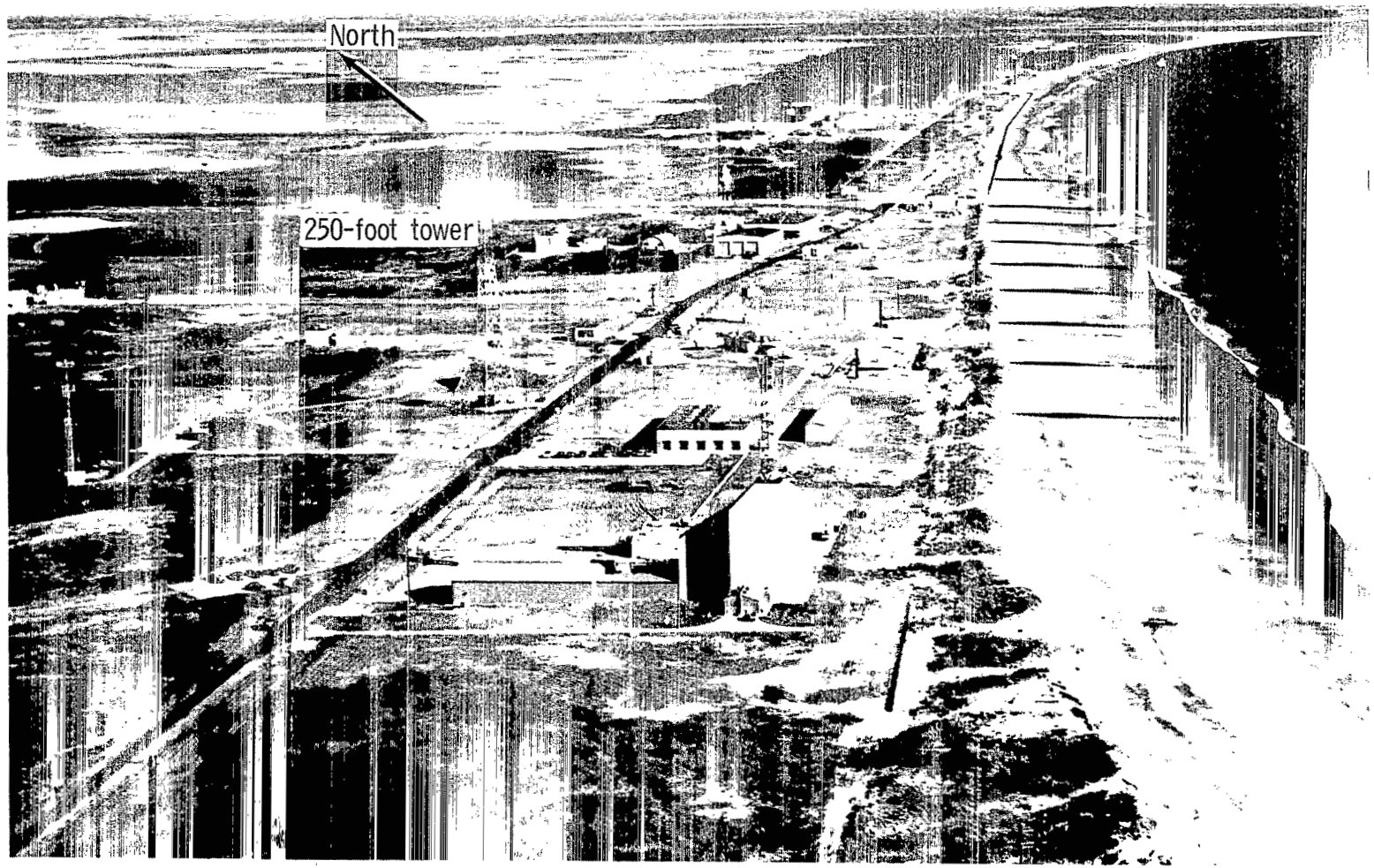


Figure 1.- Location of the 250-foot (76.20-meter) meteorological tower with respect to terrain at Wallops Island. L-62-296.1

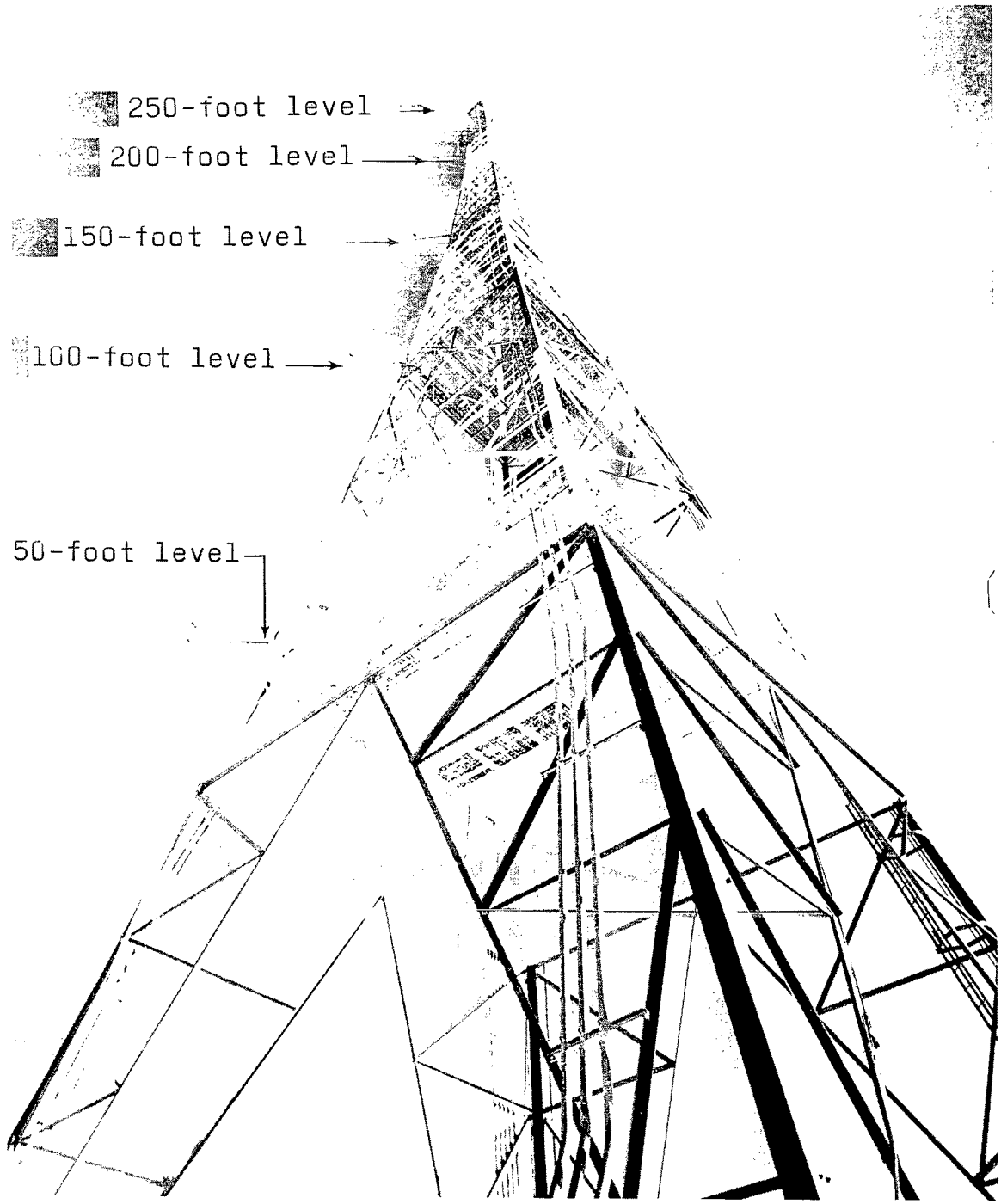
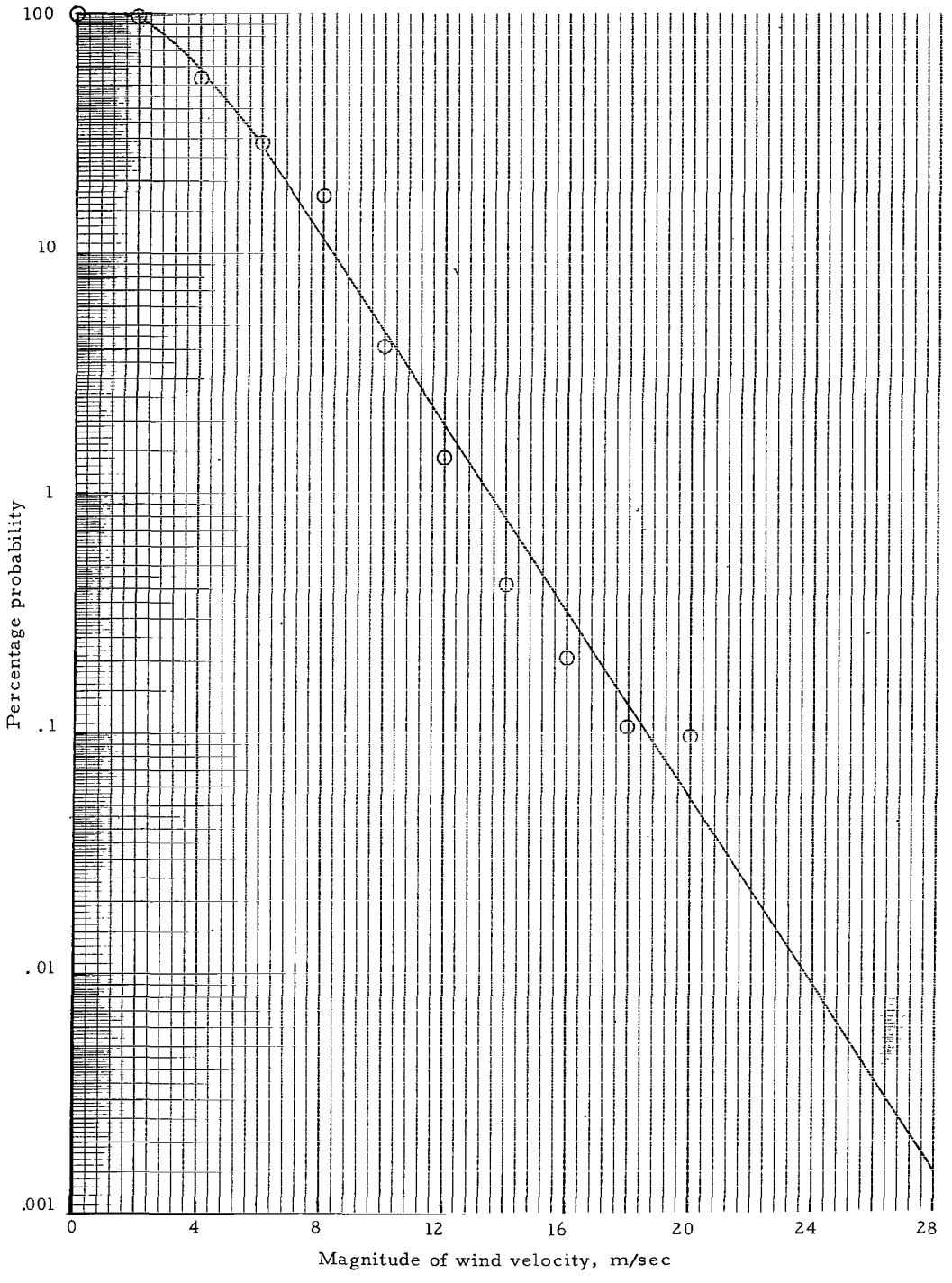
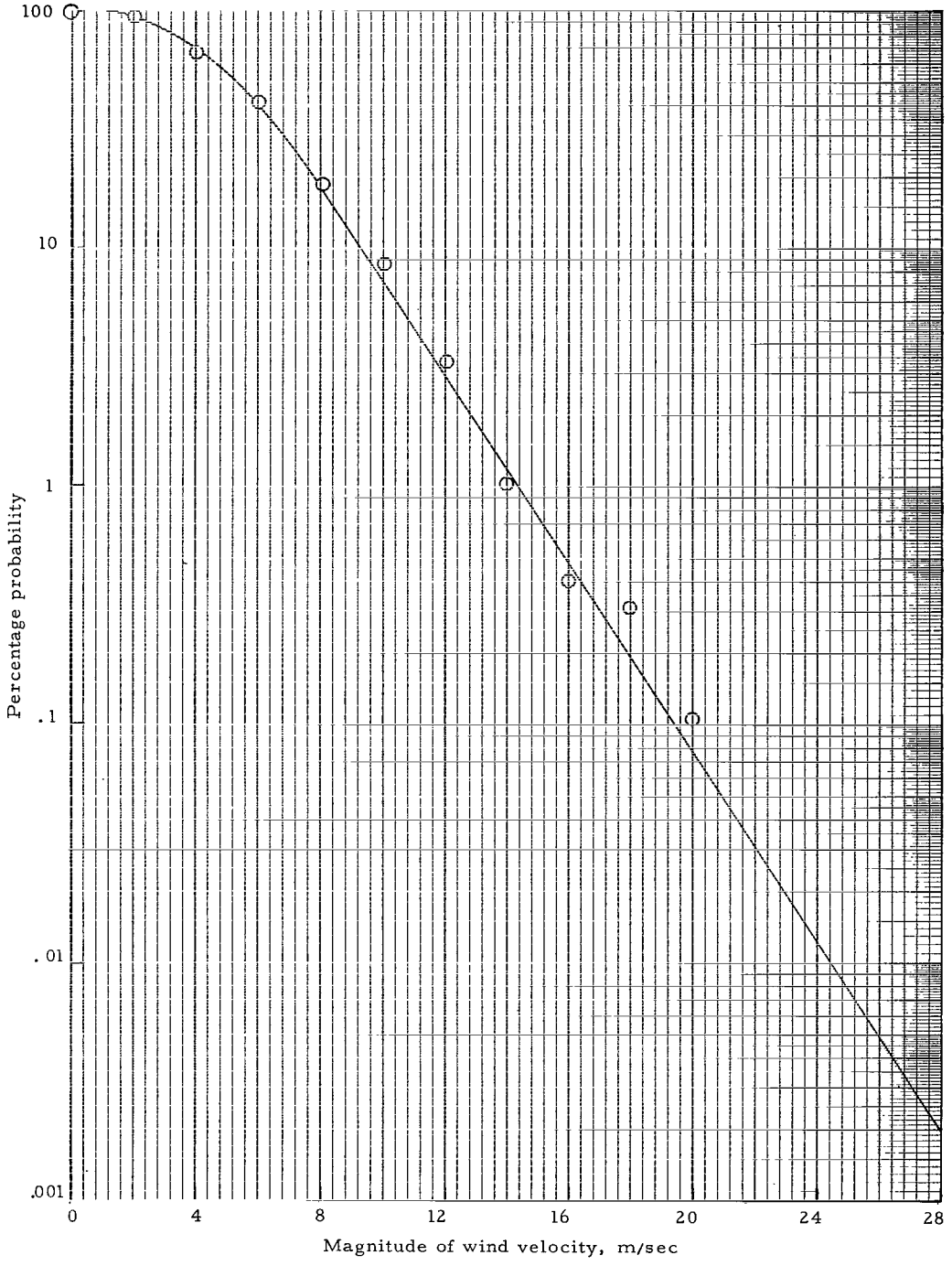


Figure 2.- Mounting arrangement of anemometers on the 250-foot (76.20 meter) tower. L-65-1007.1



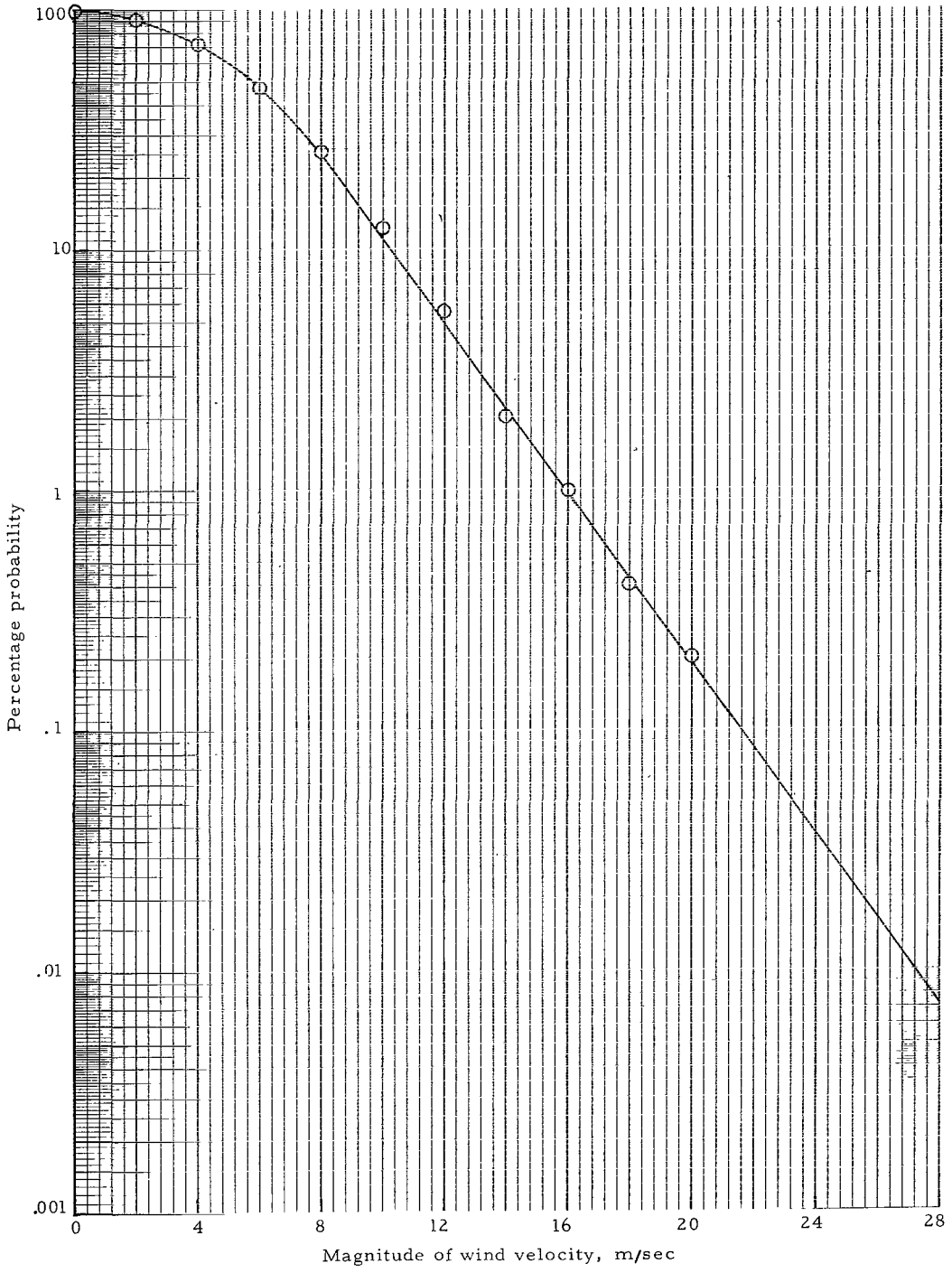
(a) 50-foot (15.24-meter) tower level.

Figure 3.- Plot showing percentage probability of exceeding given value of wind speed for annual period.



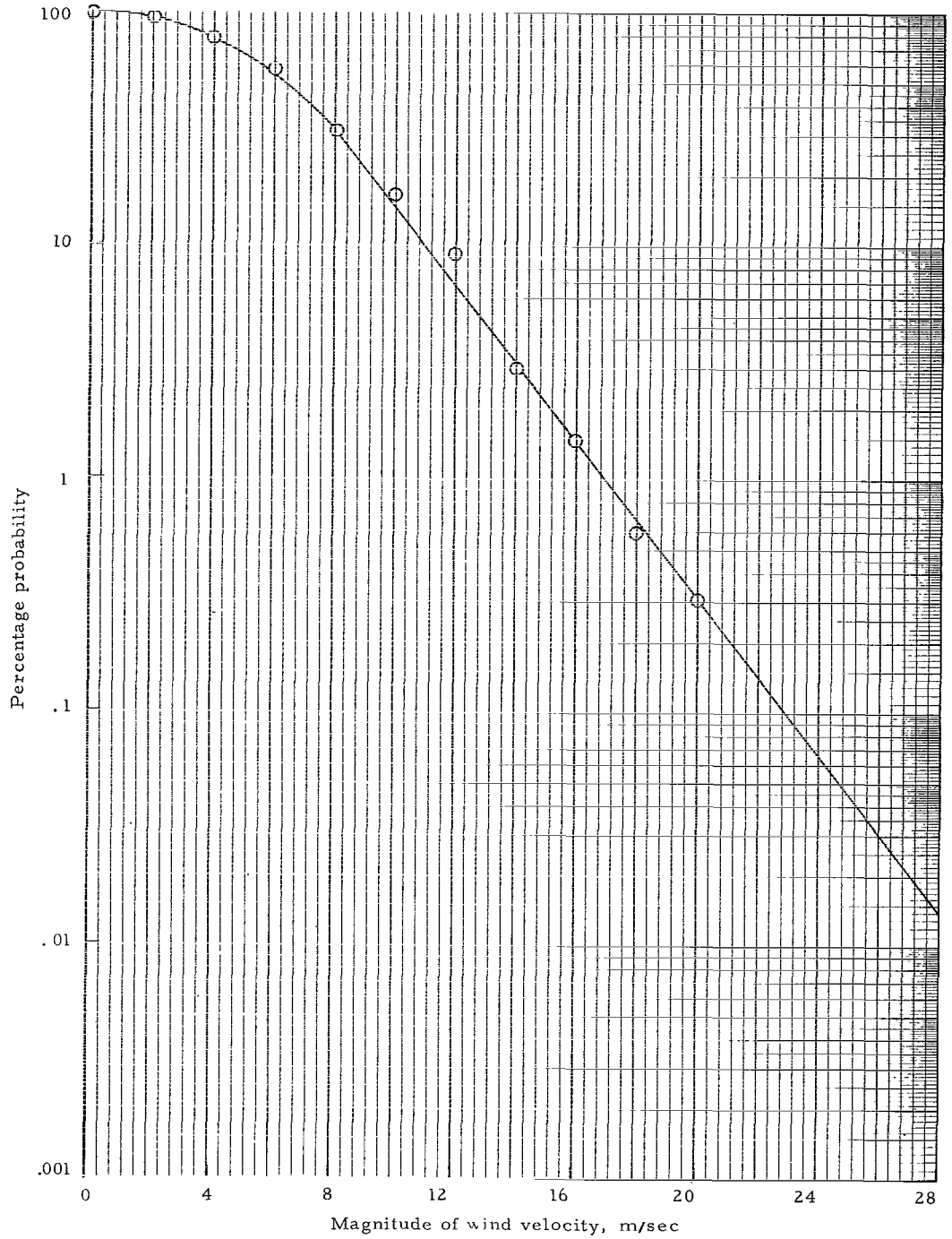
(b) 100-foot (30.48-meter) tower level.

Figure 3.- Continued.



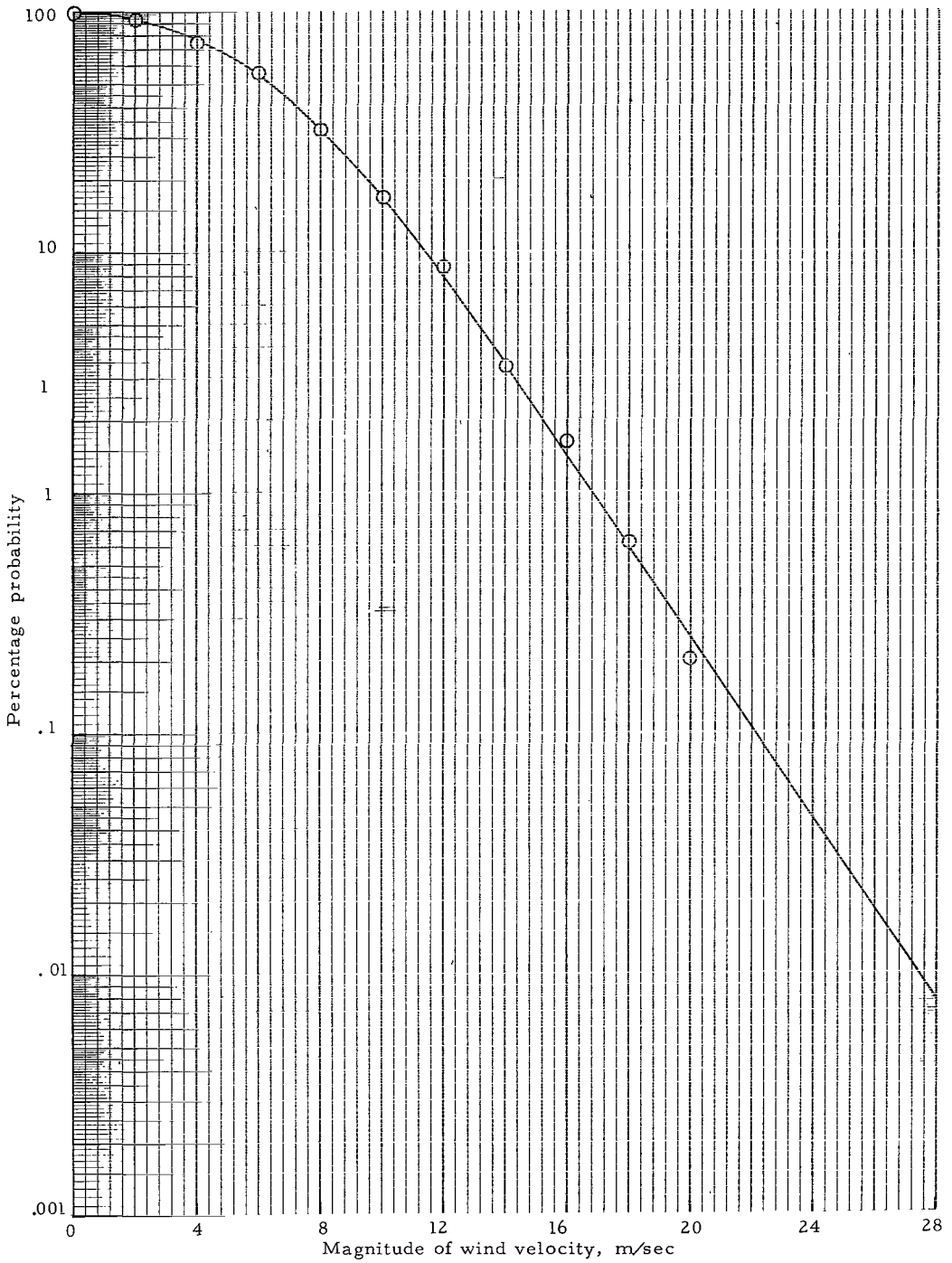
(c) 150-foot (45.72-meter) tower level.

Figure 3.- Continued.



(d) 200-foot (60.96-meter) tower level.

Figure 3.- Continued.



(e) 250-foot (76.20-meter) tower level.

Figure 3.- Concluded.

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